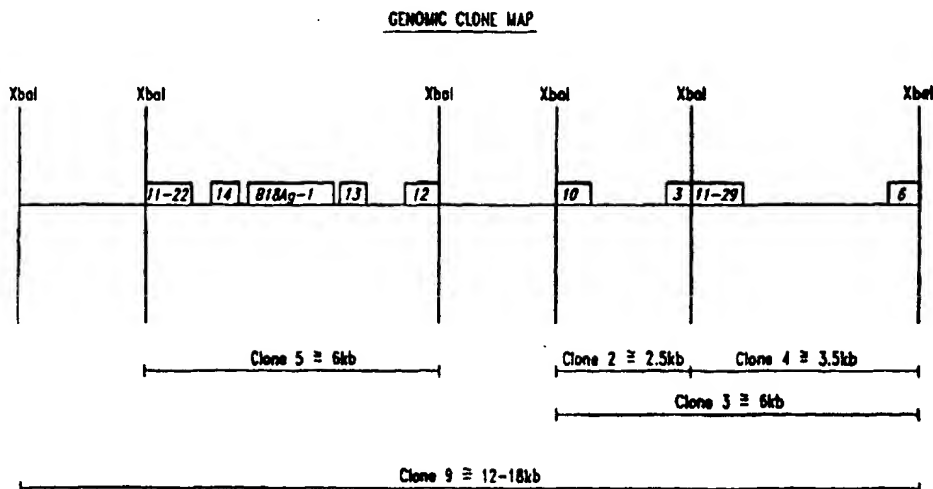




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<p>(21) International Application Number: PCT/US97/00485 (22) International Filing Date: 10 January 1997 (10.01.97) (30) Priority Data: 08/585,392 11 January 1996 (11.01.96) US 08/700,014 20 August 1996 (20.08.96) US (71) Applicant: CORIXA CORPORATION [US/US]; Suite 464, 1124 Columbia Street, Seattle, WA 98104 (US). (72) Inventors: FRUDAKIS, Tony, N.; Magnolia Station, 3211 West McGraw, P.O. Box 99232, Seattle, WA 98232-0232 (US). SMITH, John, M.; 208 - 116th Place S.E., Everett, WA 98208 (US). REED, Steven, G.; 2843 - 122nd Place N.E., Bellevue, WA 98005 (US). (74) Agents: MAKI, David, J. et al.; Seed and Berry L.L.P., 6300 Columbia Center, 701 Fifth Avenue, Seattle, WA 98104- 7092 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 30 October 1997 (30.10.97)</p>

(54) Title: COMPOSITIONS AND METHODS FOR THE TREATMENT AND DIAGNOSIS OF BREAST CANCER



(57) Abstract

Compositions and methods for the detection and therapy of breast cancer are disclosed. The compounds provided include nucleotide sequences that are preferentially expressed in breast tumor tissue, as well as polypeptides encoded by such nucleotide sequences. Vaccines and pharmaceutical compositions comprising such compounds are also provided and may be used, for example, for the prevention and treatment of breast cancer. The polypeptides may also be used for the production of antibodies, which are useful for diagnosing and monitoring the progression of breast cancer in a patient.

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(54) Title: COMPOSITIONS AND METHODS FOR THE TREATMENT AND DIAGNOSIS OF BREAST CANCER			
<p style="text-align: center;"><u>GENOMIC CLONE MAP</u></p> <p style="text-align: center;">Clone 5 \approx 6kb Clone 2 \approx 2.5kb Clone 4 \approx 3.5kb Clone 3 \approx 6kb Clone 9 \approx 12-18kb</p>			
(57) Abstract <p>Compositions and methods for the detection and therapy of breast cancer are disclosed. The compounds provided include nucleotide sequences that are preferentially expressed in breast tumor tissue, as well as polypeptides encoded by such nucleotide sequences. Vaccines and pharmaceutical compositions comprising such compounds are also provided and may be used, for example, for the prevention and treatment of breast cancer. The polypeptides may also be used for the production of antibodies, which are useful for diagnosing and monitoring the progression of breast cancer in a patient.</p>			

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DescriptionCOMPOSITIONS AND METHODS FOR THE TREATMENT
AND DIAGNOSIS OF BREAST CANCER

5

Technical Field

The present invention relates generally to the detection and therapy of breast cancer. The invention is more specifically related to nucleotide sequences that are preferentially expressed in breast tumor tissue and to polypeptides encoded by such nucleotide sequences. The nucleotide sequences and polypeptides may be used in vaccines and pharmaceutical compositions for the prevention and treatment of breast cancer. The polypeptides may also be used for the production of compounds, such as antibodies, useful for diagnosing and monitoring the progression of breast cancer in a patient.

15

Background of the Invention

Breast cancer is a significant health problem for women in the United States and throughout the world. Although advances have been made in detection and treatment of the disease, breast cancer remains the second leading cause of cancer-related deaths in women, affecting more than 180,000 women in the United States each year. For women in North America, the life-time odds of getting breast cancer are now one in eight.

No vaccine or other universally successful method for the prevention or treatment of breast cancer is currently available. Management of the disease currently relies on a combination of early diagnosis (through routine breast screening procedures) and aggressive treatment, which may include one or more of a variety of treatments such as surgery, radiotherapy, chemotherapy and hormone therapy. The course of treatment for a particular breast cancer is often selected based on a variety of prognostic parameters, including an analysis of specific tumor markers. See, e.g., Porter-Jordan and Lippman, *Breast Cancer* 8:73-100 (1994). However, the use of established markers often leads to a result that is difficult to interpret, and the high mortality

observed in breast cancer patients indicates that improvements are needed in the treatment, diagnosis and prevention of the disease.

Accordingly, there is a need in the art for improved methods for therapy and diagnosis of breast cancer. The present invention fulfills these needs and further provides other related advantages.

Summary of the Invention

Briefly stated, the subject invention provides compositions and methods for the diagnosis and therapy of breast cancer. In one aspect, isolated DNA molecules are provided, comprising (a) a nucleotide sequence preferentially expressed in breast cancer tissue, relative to normal tissue; (b) a variant of such a sequence that contains one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% (preferably no more than 5%) of the nucleotide positions, such that the antigenic and/or immunogenic properties of the polypeptide encoded by the nucleotide sequence are retained; or (c) a nucleotide sequence encoding an epitope of a polypeptide encoded by at least one of the above sequences. In one embodiment, the isolated DNA molecule comprises a human endogenous retroviral sequence recited in SEQ ID NO:1. In other embodiments, the isolated DNA molecule comprises a nucleotide sequence recited in any one of SEQ ID NO:3 - SEQ ID NO:77 or SEQ ID NOS: 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227.

In related embodiments, the isolated DNA molecule encodes an epitope of a polypeptide, wherein the polypeptide is encoded by a nucleotide sequence that: (a) hybridizes to a sequence recited in any one of SEQ ID NO:1 or SEQ ID NO:3 - SEQ ID NO:77 or SEQ ID NOS: 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227 under stringent conditions; and (b) is at least 80% identical to a sequence recited in any one of SEQ ID NO:1 or SEQ ID NO:3 - SEQ ID NO:77 or SEQ ID NOS: 142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227; and wherein RNA corresponding to said nucleotide sequence is expressed at a greater level in human breast tumor tissue than in normal breast tissue.

In another embodiment, the present invention provides an isolated DNA molecule encoding an epitope of a polypeptide, the polypeptide being encoded by: (a) a nucleotide sequence transcribed from the sequence of SEQ ID NO: 141; or (b) a variant of said nucleotide sequence that contains one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions, such that the antigenic and/or immunogenic properties of the polypeptide encoded by the nucleotide sequence are retained. Isolated DNA and RNA molecules comprising a nucleotide sequence complementary to a DNA molecule as described above are also provided.

10 In related aspects, the present invention provides recombinant expression vectors comprising a DNA molecule as described above and host cells transformed or transfected with such expression vectors.

In further aspects, polypeptides, comprising an amino acid sequence encoded by a DNA molecule as described above, and monoclonal antibodies that bind to such polypeptides are provided.

15 In yet another aspect, methods are provided for determining the presence of breast cancer in a patient. In one embodiment, the method comprises detecting, within a biological sample, a polypeptide as described above. In another embodiment, the method comprises detecting, within a biological sample, an RNA molecule encoding a polypeptide as described above. In yet another embodiment, the method comprises (a) intradermally injecting a patient with a polypeptide as described above; and (b) detecting an immune response on the patient's skin and therefrom detecting the presence of breast cancer in the patient. In further embodiments, the present invention provides methods for determining the presence of breast cancer in a patient as described above wherein the polypeptide is encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO.: 78-86, SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220 and sequences that hybridize thereto under stringent conditions.

20 In a related aspect, diagnostic kits useful in the determination of breast cancer are provided. The diagnostic kits generally comprise either one or more monoclonal antibodies as described above, or one or more monoclonal antibodies that

bind to a polypeptide encoded by a nucleotide sequence selected from the group consisting of sequences provided in SEQ ID NOS: 78-86 and SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and a detection reagent.

Within a related aspect, the diagnostic kit comprises a first polymerase chain reaction primer and a second polymerase chain reaction primer, the first and second primers each comprising at least about 10 contiguous nucleotides of an RNA molecule as described above, or an RNA molecule encoding a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NOS: 78-86 and SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220.

Within another related aspect, the diagnostic kit comprises at least one oligonucleotide probe, the probe comprising at least about 15 contiguous nucleotides of a DNA molecule as described above, or a DNA molecule selected from the group consisting of SEQ ID NOS: 78-86 and SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220.

In another related aspect, the present invention provides methods for monitoring the progression of breast cancer in a patient. In one embodiment, the method comprises: (a) detecting an amount, in a biological sample, of a polypeptide as described above at a first point in time; (b) repeating step (a) at a subsequent point in time; and (c) comparing the amounts of polypeptide detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient. In another embodiment, the method comprises (a) detecting an amount, within a biological sample, of an RNA molecule encoding a polypeptide as described above at a first point in time; (b) repeating step (a) at a subsequent point in time; and (c) comparing the amounts of RNA molecules detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient. In yet other embodiments, the present invention provides methods for monitoring the progression of breast cancer in a patient as described above wherein the polypeptide is encoded by a nucleotide sequence selected from the group consisting of SEQ ID NOS: 78-86, SEQ ID NOS: 144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220 and sequences that hybridize thereto under stringent conditions.

In still other aspects, pharmaceutical compositions, which comprise a polypeptide as described above in combination with a physiologically acceptable carrier, and vaccines, which comprise a polypeptide as described above in combination with an immune response enhancer or adjuvant are provided. In yet other aspects, the present invention provides pharmaceutical compositions and vaccines comprising a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO.: 78-86, SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220 and sequences that hybridize thereto under stringent conditions.

In related aspects, the present invention provides methods for inhibiting the development of breast cancer in a patient, comprising administering to a patient a pharmaceutical composition or vaccine as described above.

These and other aspects of the present invention will become apparent upon reference to the following detailed description and attached drawings. All references disclosed herein are hereby incorporated by reference in their entirety as if each was incorporated individually.

Brief Description of the Drawings

Figure 1 shows the differential display PCR products, separated by gel electrophoresis, obtained from cDNA prepared from normal breast tissue (lanes 1 and 2) and from cDNA prepared from breast tumor tissue from the same patient (lanes 3 and 4). The arrow indicates the band corresponding to B18Ag1.

Figure 2 is a northern blot comparing the level of B18Ag1 mRNA in breast tumor tissue (lane 1) with the level in normal breast tissue.

Figure 3 shows the level of B18Ag1 mRNA in breast tumor tissue compared to that in various normal and non-breast tumor tissues as determined by RNase protection assays.

Figure 4 is a genomic clone map showing the location of additional retroviral sequences obtained from ends of XbaI restriction digests (provided in SEQ ID NO:3 - SEQ ID NO:10) relative to B18Ag1.

Figures 5A and 5B show the sequencing strategy, genomic organization and predicted open reading frame for the retroviral element containing B18Ag1.

Figure 6 shows the nucleotide sequence of the representative breast tumor-specific cDNA B18Ag1.

5 Figure 7 shows the nucleotide sequence of the representative breast tumor-specific cDNA B17Ag1.

Figure 8 shows the nucleotide sequence of the representative breast tumor-specific cDNA B17Ag2.

10 Figure 9 shows the nucleotide sequence of the representative breast tumor-specific cDNA B13Ag2a.

Figure 10 shows the nucleotide sequence of the representative breast tumor-specific cDNA B13Ag1b.

Figure 11 shows the nucleotide sequence of the representative breast tumor-specific cDNA B13Ag1a.

15 Figure 12 shows the nucleotide sequence of the representative breast tumor-specific cDNA B11Ag1.

Figure 13 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA3c.

20 Figure 14 shows the nucleotide sequence of the representative breast tumor-specific cDNA B9CG1.

Figure 15 shows the nucleotide sequence of the representative breast tumor-specific cDNA B9CG3.

Figure 16 shows the nucleotide sequence of the representative breast tumor-specific cDNA B2CA2.

25 Figure 17 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA1.

Figure 18 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA2.

30 Figure 19 shows the nucleotide sequence of the representative breast tumor-specific cDNA B3CA3.

Figure 20 shows the nucleotide sequence of the representative breast tumor-specific cDNA B4CA1.

Figure 21A depicts RT-PCR analysis of breast tumor genes in breast tumor tissues (lanes 1-8) and normal breast tissues (lanes 9-13) and H₂O (lane 14).

5 Figure 21B depicts RT-PCR analysis of breast tumor genes in prostate tumors (lane 1,2), colon tumors (lane 3), lung tumor (lane 4), normal prostate (lane 5), normal colon (lane 6), normal kidney (lane 7), normal liver (lane 8), normal lung (lane 9), normal ovary (lanes 10, 18), normal pancreases (lanes 11, 12), normal skeletal muscle (lane 13), normal skin (lane 14), normal stomach (lane 15), normal testes (lane 10 16), normal small intestine (lane 17), HBL-100 (lane 19), MCF-12A (lane 20), breast tumors (lanes 21-23), H₂O (lane 24), and colon tumor (lane 25).

Detailed Description of the Invention

As noted above, the present invention is generally directed to
15 compositions and methods for the diagnosis, monitoring and therapy of breast cancer. The compositions described herein include polypeptides, nucleic acid sequences and antibodies. Polypeptides of the present invention generally comprise at least a portion of a protein that is expressed at a greater level in human breast tumor tissue than in normal breast tissue (*i.e.*, the level of RNA encoding the polypeptide is at least 2-fold
20 higher in tumor tissue). Such polypeptides are referred to herein as breast tumor-specific polypeptides, and cDNA molecules encoding such polypeptides are referred to as breast tumor-specific cDNAs. Nucleic acid sequences of the subject invention generally comprise a DNA or RNA sequence that encodes all or a portion of a polypeptide as described above, or that is complementary to such a sequence.
25 Antibodies are generally immune system proteins, or fragments thereof, that are capable of binding to a portion of a polypeptide as described above. Antibodies can be produced by cell culture techniques, including the generation of monoclonal antibodies as described herein, or via transfection of antibody genes into suitable bacterial or mammalian cell hosts, in order to allow for the production of recombinant antibodies.

30 Polypeptides within the scope of this invention include, but are not limited to, polypeptides (and epitopes thereof) encoded by a human endogenous

retroviral sequence, such as the sequence designated B18Ag1 (Figure 5 and SEQ ID NO:1). Also within the scope of the present invention are polypeptides encoded by other sequences within the retroviral genome containing B18Ag1 (SEQ ID NO: 141). Such sequences include, but are not limited to, the sequences recited in SEQ ID NO:3 -

5 SEQ ID NO:10. B18Ag1 has homology to the *gag* p30 gene of the endogenous human retroviral element S71, as described in Werner et al., *Virology* 174:225-238 (1990) and also shows homology to about thirty other retroviral *gag* genes. As discussed in more detail below, the present invention also includes a number of additional breast tumor-specific polypeptides, such as those encoded by the nucleotide sequences recited in

10 SEQ ID NO:11 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227. As used herein, the term "polypeptide" encompasses amino acid chains of any length, including full length proteins containing the sequences recited herein. A polypeptide comprising an epitope of a protein containing a sequence as described herein may consist entirely

15 of the epitope, or may contain additional sequences. The additional sequences may be derived from the native protein or may be heterologous, and such sequences may (but need not) possess immunogenic or antigenic properties.

An "epitope," as used herein is a portion of a polypeptide that is recognized (*i.e.*, specifically bound) by a B-cell and/or T-cell surface antigen receptor.

20 Epitopes may generally be identified using well known techniques, such as those summarized in Paul, *Fundamental Immunology*, 3rd ed., 243-247 (Raven Press, 1993) and references cited therein. Such techniques include screening polypeptides derived from the native polypeptide for the ability to react with antigen-specific antisera and/or T-cell lines or clones. An epitope of a polypeptide is a portion that reacts with such

25 antisera and/or T-cells at a level that is similar to the reactivity of the full length polypeptide (*e.g.*, in an ELISA and/or T-cell reactivity assay). Such screens may generally be performed using methods well known to those of ordinary skill in the art, such as those described in Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory, 1988. B-cell and T-cell epitopes may also be predicted via

30 computer analysis. Polypeptides comprising an epitope of a polypeptide that is

preferentially expressed in a tumor tissue (with or without additional amino acid sequence) are within the scope of the present invention.

The compositions and methods of the present invention also encompass variants of the above polypeptides and nucleic acid sequences encoding such polypeptides. A polypeptide "variant," as used herein, is a polypeptide that differs from the native polypeptide in substitutions and/or modifications, such that the antigenic and/or immunogenic properties of the polypeptide are retained. Such variants may generally be identified by modifying one of the above polypeptide sequences and evaluating the reactivity of the modified polypeptide with antisera and/or T-cells as described above. Nucleic acid variants may contain one or more substitutions, deletions, insertions and/or modifications such that the antigenic and/or immunogenic properties of the encoded polypeptide are retained. One preferred variant of the polypeptides described herein is a variant that contains nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions.

Preferably, a variant contains conservative substitutions. A "conservative substitution" is one in which an amino acid is substituted for another amino acid that has similar properties, such that one skilled in the art of peptide chemistry would expect the secondary structure and hydrophobic nature of the polypeptide to be substantially unchanged. In general, the following groups of amino acids represent conservative changes: (1) ala, pro, gly, glu, asp, gln, asn, ser, thr; (2) cys, ser, tyr, thr; (3) val, ile, leu, met, ala, phe; (4) lys, arg, his; and (5) phe, tyr, trp, his.

Variants may also (or alternatively) be modified by, for example, the deletion or addition of amino acids that have minimal influence on the immunogenic or antigenic properties, secondary structure and hydrophobic nature of the polypeptide. For example, a polypeptide may be conjugated to a signal (or leader) sequence at the N-terminal end of the protein which co-translationally or post-translationally directs transfer of the protein. The polypeptide may also be conjugated to a linker or other sequence for ease of synthesis, purification or identification of the polypeptide (e.g.,

poly-His), or to enhance binding of the polypeptide to a solid support. For example, a polypeptide may be conjugated to an immunoglobulin Fc region.

In general, nucleotide sequences encoding all or a portion of the polypeptides described herein may be prepared using any of several techniques. For example, cDNA molecules encoding such polypeptides may be cloned on the basis of the breast tumor-specific expression of the corresponding mRNAs, using differential display PCR. This technique compares the amplified products from RNA template prepared from normal and breast tumor tissue. cDNA may be prepared by reverse transcription of RNA using a (dT)₁₂AG primer. Following amplification of the cDNA using a random primer, a band corresponding to an amplified product specific to the tumor RNA may be cut out from a silver stained gel and subcloned into a suitable vector (e.g., the T-vector, Novagen, Madison, WI). Nucleotide sequences encoding all or a portion of the breast tumor-specific polypeptides disclosed herein may be amplified from cDNA prepared as described above using the random primers shown in SEQ ID NO.:87-125.

Alternatively, a gene encoding a polypeptide as described herein (or a portion thereof) may be amplified from human genomic DNA, or from breast tumor cDNA, via polymerase chain reaction. For this approach, B18Ag1 sequence-specific primers may be designed based on the sequence provided in SEQ ID NO.:1, and may be purchased or synthesized. One suitable primer pair for amplification from breast tumor cDNA is (5'ATG GCT ATT TTC GGG GGC TGA CA) (SEQ ID NO.:126) and (5'CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO.:127). An amplified portion of B18Ag1 may then be used to isolate the full length gene from a human genomic DNA library or from a breast tumor cDNA library, using well known techniques, such as those described in Sambrook et al., *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratories, Cold Spring Harbor, NY (1989). Other sequences within the retroviral genome of which B18Ag1 is a part may be similarly prepared by screening human genomic libraries using B18Ag1-specific sequences as probes. Nucleotides translated into protein from the retroviral genome shown in SEQ ID NO.: 141 may then be determined by cloning the corresponding cDNAs, predicting the open reading frames and cloning the appropriate cDNAs into a vector containing a viral

promoter, such as T7. The resulting constructs can be employed in a translation reaction, using techniques known to those of skill in the art, to identify nucleotide sequences which result in expressed protein. Similarly, primers specific for the remaining breast tumor-specific polypeptides described herein may be designed based
5 on the nucleotide sequences provided in SEQ ID NO:11 - SEQ ID NO:86 and SEQ ID NO:142-SEQ ID NO:226.

Recombinant polypeptides encoded by the DNA sequences described above may be readily prepared from the DNA sequences. For example, supernatants from suitable host/vector systems which secrete recombinant protein or polypeptide
10 into culture media may be first concentrated using a commercially available filter. Following concentration, the concentrate may be applied to a suitable purification matrix such as an affinity matrix or an ion exchange resin. Finally, one or more reverse phase HPLC steps can be employed to further purify a recombinant polypeptide.

In general, any of a variety of expression vectors known to those of
15 ordinary skill in the art may be employed to express recombinant polypeptides of this invention. Expression may be achieved in any appropriate host cell that has been transformed or transfected with an expression vector containing a DNA molecule that encodes a recombinant polypeptide. Suitable host cells include prokaryotes, yeast and higher eukaryotic cells. Preferably, the host cells employed are *E. coli*, yeast or a
20 mammalian cell line such as COS or CHO.

Such techniques may also be used to prepare polypeptides comprising epitopes or variants of the native polypeptides. For example, variants of a native polypeptide may generally be prepared using standard mutagenesis techniques, such as oligonucleotide-directed site-specific mutagenesis, and sections of the DNA sequence
25 may be removed to permit preparation of truncated polypeptides. Portions and other variants having fewer than about 100 amino acids, and generally fewer than about 50 amino acids, may also be generated by synthetic means, using techniques well known to those of ordinary skill in the art. For example, such polypeptides may be synthesized using any of the commercially available solid-phase techniques, such as the Merrifield
30 solid-phase synthesis method, where amino acids are sequentially added to a growing amino acid chain. See Merrifield, *J. Am. Chem. Soc.* 85:2149-2146 (1963). Equipment

for automated synthesis of polypeptides is commercially available from suppliers such as Applied BioSystems, Inc., Foster City, CA, and may be operated according to the manufacturer's instructions.

In specific embodiments, polypeptides of the present invention encompass amino acid sequences encoded by a DNA molecule having a sequence recited in any one of SEQ ID NO:1 or SEQ ID NO:3 - SEQ ID NO:77 or SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227, variants of such polypeptides that are encoded by DNA molecules containing one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions, and epitopes of the above polypeptides. Polypeptides within the scope of the present invention also include polypeptides (and epitopes thereof) encoded by DNA sequences that hybridize to a DNA molecule having a sequence recited in any one of SEQ ID NO:1 or SEQ ID NO:3 - SEQ ID NO:77 or SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227 under stringent conditions, wherein the DNA sequences are at least 80% identical in overall sequence to a recited sequence and wherein RNA corresponding to the nucleotide sequence is expressed at a greater level in human breast tumor tissue than in normal breast tissue. As used herein, "stringent conditions" refers to prewashing in a solution of 6X SSC, 0.2% SDS; hybridizing at 65°C, 6X SSC, 0.2% SDS overnight; followed by two washes of 30 minutes each in 1X SSC, 0.1% SDS at 65°C and two washes of 30 minutes each in 1 X SSC, 0.1% SDS at 65°C. DNA molecules according to the present invention include molecules that encode any of the above polypeptides.

In another aspect of the present invention, antibodies are provided. Such antibodies may be prepared by any of a variety of techniques known to those of ordinary skill in the art. See, e.g., Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory, 1988. In one such technique, an immunogen comprising the polypeptide is initially injected into any of a wide variety of mammals (e.g., mice, rats, rabbits, sheep or goats). In this step, the polypeptides of this invention may serve as the immunogen without modification. Alternatively, particularly for relatively short polypeptides, a superior immune response may be elicited if the

polypeptide is joined to a carrier protein, such as bovine serum albumin or keyhole limpet hemocyanin. The immunogen is injected into the animal host, preferably according to a predetermined schedule incorporating one or more booster immunizations, and the animals are bled periodically. Polyclonal antibodies specific
5 for the polypeptide may then be purified from such antisera by, for example, affinity chromatography using the polypeptide coupled to a suitable solid support.

Monoclonal antibodies specific for the antigenic polypeptide of interest may be prepared, for example, using the technique of Kohler and Milstein, *Eur. J. Immunol.* 6:511-519 (1976), and improvements thereto. Briefly, these methods involve
10 the preparation of immortal cell lines capable of producing antibodies having the desired specificity (*i.e.*, reactivity with the polypeptide of interest). Such cell lines may be produced, for example, from spleen cells obtained from an animal immunized as described above. The spleen cells are then immortalized by, for example, fusion with a myeloma cell fusion partner, preferably one that is syngeneic with the immunized
15 animal. A variety of fusion techniques may be employed. For example, the spleen cells and myeloma cells may be combined with a nonionic detergent for a few minutes and then plated at low density on a selective medium that supports the growth of hybrid cells, but not myeloma cells. A preferred selection technique uses HAT (hypoxanthine, aminopterin, thymidine) selection. After a sufficient time, usually about 1 to 2 weeks,
20 colonies of hybrids are observed. Single colonies are selected and their culture supernatants tested for binding activity against the polypeptide. Hybridomas having high reactivity and specificity are preferred.

Monoclonal antibodies may be isolated from the supernatants of growing hybridoma colonies. In addition, various techniques may be employed to
25 enhance the yield, such as injection of the hybridoma cell line into the peritoneal cavity of a suitable vertebrate host, such as a mouse. Monoclonal antibodies may then be harvested from the ascites fluid or the blood. Contaminants may be removed from the antibodies by conventional techniques, such as chromatography, gel filtration, precipitation, and extraction. The polypeptides of this invention may be used in the
30 purification process in, for example, an affinity chromatography step.

Antibodies may be used, for example, in methods for detecting breast cancer in a patient. Such methods involve using an antibody to detect the presence or absence of a breast tumor-specific polypeptide as described herein in a suitable biological sample. As used herein, suitable biological samples include tumor or normal
5 tissue biopsy, mastectomy, blood, lymph node, serum or urine samples, or other tissue, homogenate, or extract thereof obtained from a patient.

There are a variety of assay formats known to those of ordinary skill in the art for using an antibody to detect polypeptide markers in a sample. *See, e.g.,* Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory,
10 1988. For example, the assay may be performed in a Western blot format, wherein a protein preparation from the biological sample is submitted to gel electrophoresis, transferred to a suitable membrane and allowed to react with the antibody. The presence of the antibody on the membrane may then be detected using a suitable detection reagent, as described below.

15 In another embodiment, the assay involves the use of antibody immobilized on a solid support to bind to the polypeptide and remove it from the remainder of the sample. The bound polypeptide may then be detected using a second antibody or reagent that contains a reporter group. Alternatively, a competitive assay may be utilized, in which a polypeptide is labeled with a reporter group and allowed to
20 bind to the immobilized antibody after incubation of the antibody with the sample. The extent to which components of the sample inhibit the binding of the labeled polypeptide to the antibody is indicative of the reactivity of the sample with the immobilized antibody, and as a result, indicative of the concentration of polypeptide in the sample.

The solid support may be any material known to those of ordinary skill
25 in the art to which the antibody may be attached. For example, the solid support may be a test well in a microtiter plate or a nitrocellulose filter or other suitable membrane. Alternatively, the support may be a bead or disc, such as glass, fiberglass, latex or a plastic material such as polystyrene or polyvinylchloride. The support may also be a magnetic particle or a fiber optic sensor, such as those disclosed, for example, in U.S.
30 Patent No. 5,359,681.

The antibody may be immobilized on the solid support using a variety of techniques known to those in the art, which are amply described in the patent and scientific literature. In the context of the present invention, the term "immobilization" refers to both noncovalent association, such as adsorption, and covalent attachment (which may be a direct linkage between the antigen and functional groups on the support or may be a linkage by way of a cross-linking agent). Immobilization by adsorption to a well in a microtiter plate or to a membrane is preferred. In such cases, adsorption may be achieved by contacting the antibody, in a suitable buffer, with the solid support for a suitable amount of time. The contact time varies with temperature, but is typically between about 1 hour and 1 day. In general, contacting a well of a plastic microtiter plate (such as polystyrene or polyvinylchloride) with an amount of antibody ranging from about 10 ng to about 1 μ g, and preferably about 100-200 ng, is sufficient to immobilize an adequate amount of polypeptide.

Covalent attachment of antibody to a solid support may also generally be achieved by first reacting the support with a bifunctional reagent that will react with both the support and a functional group, such as a hydroxyl or amino group, on the antibody. For example, the antibody may be covalently attached to supports having an appropriate polymer coating using benzoquinone or by condensation of an aldehyde group on the support with an amine and an active hydrogen on the binding partner (*see, e.g.,* Pierce Immunotechnology Catalog and Handbook (1991) at A12-A13).

In certain embodiments, the assay for detection of polypeptide in a sample is a two-antibody sandwich assay. This assay may be performed by first contacting an antibody that has been immobilized on a solid support, commonly the well of a microtiter plate, with the biological sample, such that the polypeptide within the sample are allowed to bind to the immobilized antibody. Unbound sample is then removed from the immobilized polypeptide-antibody complexes and a second antibody (containing a reporter group) capable of binding to a different site on the polypeptide is added. The amount of second antibody that remains bound to the solid support is then determined using a method appropriate for the specific reporter group.

More specifically, once the antibody is immobilized on the support as described above, the remaining protein binding sites on the support are typically

blocked. Any suitable blocking agent known to those of ordinary skill in the art, such as bovine serum albumin or Tween 20™ (Sigma Chemical Co., St. Louis, MO). The immobilized antibody is then incubated with the sample, and polypeptide is allowed to bind to the antibody. The sample may be diluted with a suitable diluent, such as phosphate-buffered saline (PBS) prior to incubation. In general, an appropriate contact time (*i.e.*, incubation time) is that period of time that is sufficient to detect the presence of polypeptide within a sample obtained from an individual with breast cancer. Preferably, the contact time is sufficient to achieve a level of binding that is at least 95% of that achieved at equilibrium between bound and unbound polypeptide. Those of ordinary skill in the art will recognize that the time necessary to achieve equilibrium may be readily determined by assaying the level of binding that occurs over a period of time. At room temperature, an incubation time of about 30 minutes is generally sufficient.

Unbound sample may then be removed by washing the solid support with an appropriate buffer, such as PBS containing 0.1% Tween 20™. The second antibody, which contains a reporter group, may then be added to the solid support. Preferred reporter groups include enzymes (such as horseradish peroxidase), substrates, cofactors, inhibitors, dyes, radionuclides, luminescent groups, fluorescent groups and biotin. The conjugation of antibody to reporter group may be achieved using standard methods known to those of ordinary skill in the art.

The second antibody is then incubated with the immobilized antibody-polypeptide complex for an amount of time sufficient to detect the bound polypeptide. An appropriate amount of time may generally be determined by assaying the level of binding that occurs over a period of time. Unbound second antibody is then removed and bound second antibody is detected using the reporter group. The method employed for detecting the reporter group depends upon the nature of the reporter group. For radioactive groups, scintillation counting or autoradiographic methods are generally appropriate. Spectroscopic methods may be used to detect dyes, luminescent groups and fluorescent groups. Biotin may be detected using avidin, coupled to a different reporter group (commonly a radioactive or fluorescent group or an enzyme). Enzyme reporter groups may generally be detected by the addition of substrate (generally for a

specific period of time), followed by spectroscopic or other analysis of the reaction products.

To determine the presence or absence of breast cancer, the signal detected from the reporter group that remains bound to the solid support is generally compared to a signal that corresponds to a predetermined cut-off value established from non-tumor tissue. In one preferred embodiment, the cut-off value is the average mean signal obtained when the immobilized antibody is incubated with samples from patients without breast cancer. In general, a sample generating a signal that is three standard deviations above the predetermined cut-off value may be considered positive for breast cancer. In an alternate preferred embodiment, the cut-off value is determined using a Receiver Operator Curve, according to the method of Sackett et al., *Clinical Epidemiology: A Basic Science for Clinical Medicine*, p. 106-7 (Little Brown and Co., 1985). Briefly, in this embodiment, the cut-off value may be determined from a plot of pairs of true positive rates (i.e., sensitivity) and false positive rates (100%-specificity) that correspond to each possible cut-off value for the diagnostic test result. The cut-off value on the plot that is the closest to the upper left-hand corner (i.e., the value that encloses the largest area) is the most accurate cut-off value, and a sample generating a signal that is higher than the cut-off value determined by this method may be considered positive. Alternatively, the cut-off value may be shifted to the left along the plot, to minimize the false positive rate, or to the right, to minimize the false negative rate. In general, a sample generating a signal that is higher than the cut-off value determined by this method is considered positive for breast cancer.

In a related embodiment, the assay is performed in a flow-through or strip test format, wherein the antibody is immobilized on a membrane, such as nitrocellulose. In the flow-through test, the polypeptide within the sample bind to the immobilized antibody as the sample passes through the membrane. A second, labeled antibody then binds to the antibody-polypeptide complex as a solution containing the second antibody flows through the membrane. The detection of bound second antibody may then be performed as described above. In the strip test format, one end of the membrane to which antibody is bound is immersed in a solution containing the sample. The sample migrates along the membrane through a region containing second antibody

and to the area of immobilized antibody. Concentration of second antibody at the area of immobilized antibody indicates the presence of breast cancer. Typically, the concentration of second antibody at that site generates a pattern, such as a line, that can be read visually. The absence of such a pattern indicates a negative result. In general, 5 the amount of antibody immobilized on the membrane is selected to generate a visually discernible pattern when the biological sample contains a level of polypeptide that would be sufficient to generate a positive signal in the two-antibody sandwich assay, in the format discussed above. Preferably, the amount of antibody immobilized on the membrane ranges from about 25 ng to about 1 µg. and more preferably from about 50 10 ng to about 1 µg. Such tests can typically be performed with a very small amount of biological sample.

The presence or absence of breast cancer in a patient may also be determined by evaluating the level of mRNA encoding a breast tumor-specific polypeptide as described herein within the biological sample (*e.g.*, a biopsy, 15 mastectomy and/or blood sample from a patient) relative to a predetermined cut-off value. Such an evaluation may be achieved using any of a variety of methods known to those of ordinary skill in the art such as, for example, *in situ* hybridization and amplification by polymerase chain reaction. For example, polymerase chain reaction may be used to amplify sequences from cDNA prepared from RNA that is isolated from 20 one of the above biological samples. Sequence-specific primers for use in such amplification may be designed based on the sequences provided in any one of SEQ ID NO:1 or SEQ ID NO:11 - SEQ ID NO:86 and SEQ ID NO:142-SEQ ID NO:226, and may be purchased or synthesized. In the case of B18Ag1, as noted herein, one suitable primer pair is B18Ag1-2 (5'ATG GCT ATT TTC GGG GGC TGA CA) (SEQ ID 25 NO.:126) and B18Ag1-3 (5'CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO.:127). The PCR reaction products may then be separated by gel electrophoresis and visualized according to methods well known to those of ordinary skill in the art. Amplification is typically performed on samples obtained from matched pairs of tissue (tumor and non-tumor tissue from the same individual) or from unmatched pairs of 30 tissue (tumor and non-tumor tissue from different individuals). The amplification reaction is preferably performed on several dilutions of cDNA spanning two orders of

magnitude. A two-fold or greater increase in expression in several dilutions of the tumor sample as compared to the same dilution of the non-tumor sample is considered positive.

Conventional RT-PCR protocols using agarose and ethidium bromide staining while important in defining gene specificity do not lend themselves to diagnostic kit development because of the time and effort required in making them quantitative (i.e., construction of saturation and/or titration curves), and their sample throughput. This problem is overcome by the development of procedures such as real time RT-PCR which allows for assays to be performed in single tubes, and in turn can be modified for use in 96 well plate formats. Instrumentation to perform such methodologies are available from ABI/Perkin Elmer. Alternatively, other high throughput assays using labelled probes (e.g., digoxigenin) in combination with labelled (e.g., enzyme fluorescent, radioactive) antibodies to such probes can also be used in the development of 96 well plate assays.

In yet another method for determining the presence or absence of breast cancer in a patient, one or more of the breast tumor-specific polypeptides described may be used in a skin test. As used herein, a "skin test" is any assay performed directly on a patient in which a delayed-type hypersensitivity (DTH) reaction (such as swelling, reddening or dermatitis) is measured following intradermal injection of one or more polypeptides as described above. Such injection may be achieved using any suitable device sufficient to contact the polypeptide or polypeptides with dermal cells of the patient, such as a tuberculin syringe or 1 mL syringe. Preferably, the reaction is measured at least 48 hours after injection, more preferably 48-72 hours.

The DTH reaction is a cell-mediated immune response, which is greater in patients that have been exposed previously to a test antigen (i.e., an immunogenic portion of a polypeptide employed, or a variant thereof). The response may be measured visually, using a ruler. In general, a response that is greater than about 0.5 cm in diameter, preferably greater than about 5.0 cm in diameter, is a positive response, indicative of breast cancer.

The breast tumor-specific polypeptides described herein are preferably formulated, for use in a skin test, as pharmaceutical compositions containing at least

one polypeptide and a physiologically acceptable carrier, such as water, saline, alcohol, or a buffer. Such compositions typically contain one or more of the above polypeptides in an amount ranging from about 1 μ g to 100 μ g, preferably from about 10 μ g to 50 μ g in a volume of 0.1 mL. Preferably, the carrier employed in such pharmaceutical compositions is a saline solution with appropriate preservatives, such as phenol and/or Tween 80™.

In other aspects of the present invention, the progression and/or response to treatment of a breast cancer may be monitored by performing any of the above assays over a period of time, and evaluating the change in the level of the response (*i.e.*, the amount of polypeptide or mRNA detected or, in the case of a skin test, the extent of the immune response detected). For example, the assays may be performed every month to every other month for a period of 1 to 2 years. In general, breast cancer is progressing in those patients in whom the level of the response increases over time. In contrast, breast cancer is not progressing when the signal detected either remains constant or decreases with time.

In further aspects of the present invention, the compounds described herein may be used for the immunotherapy of breast cancer. In these aspects, the compounds (which may be polypeptides, antibodies or nucleic acid molecules) are preferably incorporated into pharmaceutical compositions or vaccines. Pharmaceutical compositions comprise one or more such compounds and a physiologically acceptable carrier. Vaccines may comprise one or more polypeptides and an immune response enhancer, such as an adjuvant or a liposome (into which the compound is incorporated). Pharmaceutical compositions and vaccines may additionally contain a delivery system, such as biodegradable microspheres which are disclosed, for example, in U.S. Patent Nos. 4,897,268 and 5,075,109. Pharmaceutical compositions and vaccines within the scope of the present invention may also contain other compounds, including one or more separate polypeptides.

Alternatively, a vaccine may contain DNA encoding one or more of the polypeptides as described above, such that the polypeptide is generated *in situ*. In such vaccines, the DNA may be present within any of a variety of delivery systems known to those of ordinary skill in the art, including nucleic acid expression systems, bacteria and

viral expression systems. Appropriate nucleic acid expression systems contain the necessary DNA sequences for expression in the patient (such as a suitable promoter and terminating signal). Bacterial delivery systems involve the administration of a bacterium (such as *Bacillus-Calmette-Guerrin*) that expresses an immunogenic portion of the polypeptide on its cell surface. In a preferred embodiment, the DNA may be introduced using a viral expression system (e.g., vaccinia or other pox virus, retrovirus, or adenovirus), which may involve the use of a non-pathogenic (defective), replication competent virus. Techniques for incorporating DNA into such expression systems are well known to those of ordinary skill in the art. The DNA may also be "naked," as described, for example, in Ulmer et al., *Science* 259:1745-1749 (1993), and reviewed by Cohen, *Science* 259:1691-1692 (1993). The uptake of naked DNA may be increased by coating the DNA onto biodegradable beads, which are efficiently transported into the cells.

While any suitable carrier known to those of ordinary skill in the art may be employed in the pharmaceutical compositions of this invention, the type of carrier will vary depending on the mode of administration. For parenteral administration, such as subcutaneous injection, the carrier preferably comprises water, saline, alcohol, a fat, a wax or a buffer. For oral administration, any of the above carriers or a solid carrier, such as mannitol, lactose, starch, magnesium stearate, sodium saccharine, talcum, cellulose, glucose, sucrose, and magnesium carbonate, may be employed. Biodegradable microspheres (e.g., polylactate polyglycolate) may also be employed as carriers for the pharmaceutical compositions of this invention.

Any of a variety of adjuvants may be employed in the vaccines of this invention to nonspecifically enhance the immune response. Most adjuvants contain a substance designed to protect the antigen from rapid catabolism, such as aluminum hydroxide or mineral oil, and a stimulator of immune responses, such as lipid A, *Bordetella pertussis* or *Mycobacterium tuberculosis* derived proteins. Suitable adjuvants are commercially available as, for example, Freund's Incomplete Adjuvant and Complete Adjuvant (Difco Laboratories, Detroit, MI), Merck Adjuvant 65 (Merck and Company, Inc., Rahway, NJ), alum, biodegradable microspheres, monophosphoryl

lipid A and quil A. Cytokines, such as GM-CSF or interleukin-2, -7, or -12, may also be used as adjuvants.

The above pharmaceutical compositions and vaccines may be used, for example, for the therapy of breast cancer in a patient. As used herein, a "patient" refers to any warm-blooded animal, preferably a human. A patient may or may not be afflicted with breast cancer. Accordingly, the above pharmaceutical compositions and vaccines may be used to prevent the development of breast cancer or to treat a patient afflicted with breast cancer. To prevent the development of breast cancer, a pharmaceutical composition or vaccine comprising one or more polypeptides as described herein may be administered to a patient. Alternatively, naked DNA or plasmid or viral vector encoding the polypeptide may be administered. For treating a patient with breast cancer, the pharmaceutical composition or vaccine may comprise one or more polypeptides, antibodies or nucleotide sequences complementary to DNA encoding a polypeptide as described herein (e.g., antisense RNA or antisense deoxyribonucleotide oligonucleotides).

Routes and frequency of administration, as well as dosage, will vary from individual to individual. In general, the pharmaceutical compositions and vaccines may be administered by injection (e.g., intracutaneous, intramuscular, intravenous or subcutaneous), intranasally (e.g., by aspiration) or orally. Between 1 and 10 doses may be administered for a 52-week period. Preferably, 6 doses are administered, at intervals of 1 month, and booster vaccinations may be given periodically thereafter. Alternate protocols may be appropriate for individual patients. A suitable dose is an amount of a compound that, when administered as described above, is capable of promoting an anti-tumor immune response. Such response can be monitored by measuring the anti-tumor antibodies in a patient or by vaccine-dependent generation of cytolytic effector cells capable of killing the patient's tumor cells *in vitro*. Such vaccines should also be capable of causing an immune response that leads to an improved clinical outcome (e.g., more frequent remissions, complete or partial or longer disease-free survival) in vaccinated patients as compared to non-vaccinated patients. In general, for pharmaceutical compositions and vaccines comprising one or more polypeptides, the amount of each polypeptide present in a dose ranges from about

100 μg to 5 mg. Suitable dose sizes will vary with the size of the patient, but will typically range from about 0.1 mL to about 5 mL.

The following Examples are offered by way of illustration and not by
5 way of limitation.

EXAMPLES

Example 1Preparation of Breast Tumor-Specific cDNAs Using Differential Display RT-PCR

5

This Example illustrates the preparation of cDNA molecules encoding breast tumor-specific polypeptides using a differential display screen.

A. Preparation of B18Ag1 cDNA and Characterization of mRNA Expression

10

Tissue samples were prepared from breast tumor and normal tissue of a patient with breast cancer that was confirmed by pathology after removal from the patient. Normal RNA and tumor RNA was extracted from the samples and mRNA was isolated and converted into cDNA using a (dT)₁₂AG (SEQ ID NO.:130) anchored 3' primer. Differential display PCR was then executed using a randomly chosen primer
15 (CTTCAACCTC) (SEQ ID NO.:103). Amplification conditions were standard buffer containing 1.5 mM MgCl₂, 20 pmol of primer, 500 pmol dNTP, and 1 unit of *Taq* DNA polymerase (Perkin-Elmer, Branchburg, NJ). Forty cycles of amplification were performed using 94°C denaturation for 30 seconds, 42°C annealing for 1 minute, and 72°C extension for 30 seconds. An RNA fingerprint containing 76 amplified products
20 was obtained. Although the RNA fingerprint of breast tumor tissue was over 98% identical to that of the normal breast tissue, a band was repeatedly observed to be specific to the RNA fingerprint pattern of the tumor. This band was cut out of a silver stained gel, subcloned into the T-vector (Novagen, Madison, WI) and sequenced.

The sequence of the cDNA, referred to as B18Ag1, is provided in SEQ
25 ID NO:1. A database search of GENBANK and EMBL revealed that the B18Ag1 fragment initially cloned is 77% identical to the endogenous human retroviral element S71, which is a truncated retroviral element homologous to the Simian Sarcoma Virus (SSV). S71 contains an incomplete *gag* gene, a portion of the *pol* gene and an LTR-like structure at the 3' terminus (see Werner et al., *Virology* 174:225-238 (1990)).
30 B18Ag1 is also 64% identical to SSV in the region corresponding to the P30 (*gag*) locus. B18Ag1 contains three separate and incomplete reading frames covering a

region which shares considerable homology to a wide variety of gag proteins of retroviruses which infect mammals. In addition, the homology to S71 is not just within the gag gene, but spans several kb of sequence including an LTR.

B18Ag1-specific PCR primers were synthesized using computer analysis guidelines. RT-PCR amplification (94°C, 30 seconds; 60°C → 42°C, 30 seconds; 72°C, 30 seconds for 40 cycles) confirmed that B18Ag1 represents an actual mRNA sequence present at relatively high levels in the patient's breast tumor tissue. The primers used in amplification were B18Ag1-1 (CTG CCT GAG CCA CAA ATG) (SEQ ID NO.:128) and B18Ag1-4 (CCG GAG GAG GAA GCT AGA GGA ATA) (SEQ ID NO.:129) at a 3.5 mM magnesium concentration and a pH of 8.5, and B18Ag1-2 (ATG GCT ATT TTC GGG GCC TGA CA) (SEQ ID NO.:126) and B18Ag1-3 (CCG GTA TCT CCT CGT GGT TATT) (SEQ ID NO.:127) at 2 mM magnesium at pH 9.5. The same experiments showed exceedingly low to nonexistent levels of expression in this patient's normal breast tissue (*see* Figure 1). RT-PCR experiments were then used to show that B18Ag1 mRNA is present in nine other breast tumor samples (from Brazilian and American patients) but absent in, or at exceedingly low levels in, the normal breast tissue corresponding to each cancer patient. RT-PCR analysis has also shown that the B18Ag1 transcript is not present in various normal tissues (including lymph node, myocardium and liver) and present at relatively low levels in PBMC and lung tissue. The presence of B18Ag1 mRNA in breast tumor samples, and its absence from normal breast tissue, has been confirmed by Northern blot analysis, as shown in Figure 2.

The differential expression of B18Ag1 in breast tumor tissue was also confirmed by RNase protection assays. Figure 3 shows the level of B18Ag1 mRNA in various tissue types as determined in four different RNase protection assays. Lanes 1-12 represent various normal breast tissue samples, lanes 13-25 represent various breast tumor samples; lanes 26-27 represent normal prostate samples; lanes 28-29 represent prostate tumor samples; lanes 30-32 represent colon tumor samples; lane 33 represents normal aorta; lane 34 represents normal small intestine; lane 35 represents normal skin, lane 36 represents normal lymph node; lane 37 represents normal ovary; lane 38 represents normal liver; lane 39 represents normal skeletal muscle; lane 40 represents a

first normal stomach sample, lane 41 represents a second normal stomach sample; lane 42 represents a normal lung; lane 43 represents normal kidney; and lane 44 represents normal pancreas. Interexperimental comparison was facilitated by including a positive control RNA of known B-actin message abundance in each assay and
5 normalizing the results of the different assays with respect to this positive control.

RT-PCR and Southern Blot analysis has shown the B18Ag1 locus to be present in human genomic DNA as a single copy endogenous retroviral element. A genomic clone of approximately 12-18 kb was isolated using the initial B18Ag1 sequence as a probe. Four additional subclones were also isolated by XbaI digestion.
10 Additional retroviral sequences obtained from the ends of the XbaI digests of these clones (located as shown in Figure 4) are shown as SEQ ID NO:3 - SEQ ID NO:10, where SEQ ID NO:3 shows the location of the sequence labeled 10 in Figure 4, SEQ ID NO:4 shows the location of the sequence labeled 11-29, SEQ ID NO:5 shows the location of the sequence labeled 3, SEQ ID NO:6 shows the location of the sequence
15 labeled 6, SEQ ID NO:7 shows the location of the sequence labeled 12, SEQ ID NO:8 shows the location of the sequence labeled 13, SEQ ID NO:9 shows the location of the sequence labeled 14 and SEQ ID NO:10 shows the location of the sequence labeled 11-22.

Subsequent studies demonstrated that the 12-18 kb genomic clone
20 contains a retroviral element of about 7.75 kb, as shown in Figures 5A and 5B. The sequence of this retroviral element is shown in SEQ ID NO: 141. The numbered line at the top of Figure 5A represents the sense strand sequence of the retroviral genomic clone. The box below this line shows the position of selected restriction sites. The arrows depict the different overlapping clones used to sequence the retroviral element.
25 The direction of the arrow shows whether the single-pass subclone sequence corresponded to the sense or anti-sense strand. Figure 5B is a schematic diagram of the retroviral element containing B18Ag1 depicting the organization of viral genes within the element. The open boxes correspond to predicted reading frames, starting with a methionine, found throughout the element. Each of the six likely reading frames is
30 shown, as indicated to the left of the boxes, with frames 1-3 corresponding to those found on the sense strand.

Using the cDNA of SEQ ID NO:1 as a probe, a longer cDNA was obtained (SEQ ID NO:227) which contains minor nucleotide differences (less than 1%) compared to the genomic sequence shown in SEQ ID NO:141.

5 B. Preparation of cDNA Molecules Encoding Other Breast Tumor-Specific Polypeptides

Normal RNA and tumor RNA was prepared and mRNA was isolated and converted into cDNA using a (dT)₁₂AG anchored 3' primer, as described above. Differential display PCR was then executed using the randomly chosen primers
10 ID NO.: 87-125. Amplification conditions were as noted above, and bands observed to be specific to the RNA fingerprint pattern of the tumor were cut out of a silver stained gel, subcloned into either the T-vector (Novagen, Madison, WI) or the pCRII vector (Invitrogen, San Diego, CA) and sequenced. The sequences are provided in SEQ ID NO:11 - SEQ ID NO:86. Of the 79 sequences isolated, 67 were found to be novel
15 (SEQ ID NO.:11-77) (*see also* Figures 6-20). Subsequent studies identified an additional 84 sequences (SEQ ID NOS:142-226), of which 72 appeared to be novel (SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227). To the best of the inventors' knowledge none of the previously identified sequences have heretofore been shown to be expressed at a
20 greater level in human breast tumor tissue than in normal breast tissue.

Table I shows the level of representative breast tumor-specific transcripts present in normal breast tissue (columns BNI -BN7), breast tumor samples (columns BTI-BT12) and normal prostate, kidney, liver, lung, skin, small intestine, stomach, myocardium, lymph node, pancreas, skeletal muscle, ovary and aorta, as
25 determined by RT-PCR analysis. A 0-3 grading scale for message abundance is used, with 0 denoting no detectable message and 3 a message level comparable to the control message (glyceraldehyde 3-phosphate dehydrogenase). The lack of data in a given box indicates that the tissue has not been tested for the presence or absence of that specific antigen.

TABLE I

CLONE	BN1	BN2	BN3	BN3	BN4	BN5	BN6	BN7	BT1	BT2	BT3	BT4	BT5	BT6	BT7	BT8	BT9	BT10	BT11	BT12
B2CA1							1					1								3
B2CA2							1					0								2
B3CA1							3					3								3
B3CA3c							0	0			0	0						0		1
B3CA3							1					1								2
B4CA1							0	0			0	0						0	0	2
B9CG1							0	0			0	0						0	1	2
B9CG3							0	0			0	0								
B11AG1		0	0	0	0	0			0	0	0	0	0	0	0	0				
B13AG1a							0	0				2								3
B13AG1b		2	2	2	2	2			2	2	2	2	2	2	2	2				
B13AG2		0	1	0					1	2	1	2	3	3	3	2				
B15AG1		0	1	0	0	1			2	3	2	2	3	3	3	0				
B17AG1																	2			
B18AG1a	1	0	0	0	0	0			3	3	2	3	3	3	2	3	3			
B16ACI-3		0	0	0	0	0			0	0	0	0	0	0	0	0				
B12CA1		0	1	2	2	2			2	1	2	0	3	0	2	2				
B12CA2		1	1	2	1	2			3	3	2	2	3	0	2	2				
B13CA1-36		0	0	0	0	2			1	1	1	0	2	1	3	2				
B13CA1-37		0	1	2	2	1			3	2	3	0	2	1	3	2				
B14CA1		0	0	1	0	0			2	2	3	0	2	1	2	2				
B16CA1		0	0	1	0	1			2	2	2	1	2	2	2	2				
B16GC2a									3	3		3	3		3		3	3	3	
B22GA2									0	1		1	0		1		2	1	0	
B34GA1		1	0			1			2		1	3	3			1	1	1	1	

CLONE	prostate	kidney	liver	lung	skin	sm. intestine	stomach	myocardium	lymph node	pancreas	skel. muscle	ovary	aorta
B2CA1													
B2CA2													
B3CA1													
B3CA3c													
B3CA3			0	0				0	0				
B4CA1													
B9CG1			1	0				0	0				
B9CG3			1	0				0	0				
B11AG1													
B13AG1a	0		0	0				0					
B13AG1b													
B13AG2													
B15AG1			0	3				0	0				
B17AG1					0	0			0				
B18AG1a	0	0	0	1	0	0	1			0	0	0	0
B16AC1-3													
B12CA1													
B12CA2													
B13CA1-36													
B13CA1-37													
B14CA1													
B16CA1													
B16GC2a	3	3	3	3	3	3	3						
B22GA2	0	0	0	1	0	0	0						
B34GA1		1	1	2	2	1	2						

Example 2

Preparation of B18Ag1 DNA from Human Genomic DNA

This Example illustrates the preparation of B18Ag1 DNA by
5 amplification from human genomic DNA.

B18Ag1 DNA may be prepared from 250 ng human genomic DNA using 20 pmol of B18Ag1 specific primers, 500 pmol dNTPS and 1 unit of *Taq* DNA polymerase (Perkin Elmer, Branchburg, NJ) using the following amplification parameters: 94°C for 30 seconds denaturing, 30 seconds 60°C to 42°C touchdown
10 annealing in 2°C increments every two cycles and 72°C extension for 30 seconds. The last increment (a 42°C annealing temperature) should cycle 25 times. Primers were selected using computer analysis. Primers synthesized were B18Ag1-1, B18Ag1-2, B18Ag1-3, and B18Ag1-4. Primer pairs that may be used are 1+3, 1+4, 2+3, and 2+4.

Following gel electrophoresis, the band corresponding to B18Ag1 DNA
15 may be excised and cloned into a suitable vector.

Example 3

Preparation of B18Ag1 DNA from Breast Tumor cDNA

20 This Example illustrates the preparation of B18Ag1 DNA by amplification from human breast tumor cDNA.

First strand cDNA is synthesized from RNA prepared from human breast tumor tissue in a reaction mixture containing 500 ng poly A+ RNA, 200 pmol of the primer (T)₁₂AG (*i.e.*, TTT TTT TTT TTT AG) (SEQ ID NO: 130), 1X first strand
25 reverse transcriptase buffer, 6.7 mM DTT, 500 mmol dNTPs, and 1 unit AMV or MMLV reverse transcriptase (from any supplier, such as Gibco-BRL (Grand Island, NY)) in a final volume of 30 µl. After first strand synthesis, the cDNA is diluted approximately 25 fold and 1 µl is used for amplification as described in Example 2. While some primer pairs can result in a heterogeneous population of transcripts, the
30 primers B18Ag1-2 (5'ATG GCT ATT TTC GGG GGC TGA CA) (SEQ ID NO: 126)

and B18Ag1-3 (5'CCG GTA TCT CCT CGT GGG TAT T) (SEQ ID NO: 127) yield a single 151 bp amplification product.

Example 4

5

Identification of B-cell and T-cell Epitopes of B18Ag1

This Example illustrates the identification of B18Ag1 epitopes.

The B18Ag1 sequence can be screened using a variety of computer algorithms. To determine B-cell epitopes, the sequence can be screened for
10 hydrophobicity and hydrophilicity values using the method of Hopp, *Prog. Clin. Biol. Res.* 172B:367-77 (1985) or, alternatively, Cease et al., *J. Exp. Med.* 164:1779-84 (1986) or Spouge et al., *J. Immunol.* 138:204-12 (1987). Additional Class II MHC (antibody or B-cell) epitopes can be predicted using programs such as AMPHI (e.g., Margalit et al., *J. Immunol.* 138:2213 (1987)) or the methods of Rothbard and Taylor
15 (e.g., *EMBO J.* 7:93 (1988)).

Once peptides (15-20 amino acids long) are identified using these techniques, individual peptides can be synthesized using automated peptide synthesis equipment (available from manufacturers such as Applied Biosystems, Inc., Foster City, CA) and techniques such as Merrifield synthesis. Following synthesis, the
20 peptides can be used to screen sera harvested from either normal or breast cancer patients to determine whether patients with breast cancer possess antibodies reactive with the peptides. Presence of such antibodies in breast cancer patient would confirm the immunogenicity of the specific B-cell epitope in question. The peptides can also be tested for their ability to generate a serologic or humoral immune in animals (mice, rats,
25 rabbits, chimps etc.) following immunization *in vivo*. Generation of a peptide-specific antiserum following such immunization further confirms the immunogenicity of the specific B-cell epitope in question.

To identify T-cell epitopes, the B18Ag1 sequence can be screened using different computer algorithms which are useful in identifying 8-10 amino acid motifs
30 within the B18Ag1 sequence which are capable of binding to HLA Class I MHC molecules. (see, e.g., Rammensee et al., *Immunogenetics* 41:178-228 (1995)).

Following synthesis such peptides can be tested for their ability to bind to class I MHC using standard binding assays (e.g., Sette et al., *J. Immunol.* 153:5586-92 (1994)) and more importantly can be tested for their ability to generate antigen reactive cytotoxic T-cells following *in vitro* stimulation of patient or normal peripheral mononuclear cells using, for example, the methods of Bakker et al., *Cancer Res.* 55:5330-34 (1995); Visseren et al., *J. Immunol.* 154:3991-98 (1995); Kawakami et al., *J. Immunol.* 154:3961-68 (1995); and Kast et al., *J. Immunol.* 152:3904-12 (1994). Successful *in vitro* generation of T-cells capable of killing autologous (bearing the same Class I MHC molecules) tumor cells following *in vitro* peptide stimulation further confirms the immunogenicity of the B18Ag1 antigen. Furthermore, such peptides may be used to generate murine peptide and B18Ag1 reactive cytotoxic T-cells following *in vivo* immunization in mice rendered transgenic for expression of a particular human MHC Class I haplotype (Vitiello et al., *J. Exp. Med.* 173:1007-15 (1991)).

A representative list of predicted B18Ag1 B-cell and T-cell epitopes, broken down according to predicted HLA Class I MHC binding antigen, is shown below:

Predicted Th Motifs (B-cell epitopes) (SEQ ID NOS.: 131-133)

SSGGRTFDDFHRYLLVGI
 20 QGAAQKPINLSKXIEVVQGHDE
 SPGVFLEHLQEAYRIYTPFDLSA

Predicted HLA A2.1 Motifs (T-cell epitopes) (SEQ ID NOS.: 134-140)

YLLVGIQGA
 25 GAAQKPINL
 NLSKXIEVV
 EVVQGHDES
 HLQEAYRIY
 NLAQVAQAA
 30 FVAQAAPDS

Example 5Characterization of Breast Tumor Genes Discovered by Differential Display PCR

5 The specificity and sensitivity of the breast tumor genes discovered by differential display PCR were determined using RT-PCR. This procedure enabled the rapid evaluation of breast tumor gene mRNA expression semiquantitatively without using large amounts of RNA. Using gene specific primers, mRNA expression levels in a variety of tissues were examined, including 8 breast tumors, 5 normal breasts, 2
10 prostate tumors, 2 colon tumors, 1 lung tumor, and 14 other normal adult human tissues, including normal prostate, colon, kidney, liver, lung, ovary, pancreas, skeletal muscle, skin, stomach and testes.

 To ensure the semiquantitative nature of the RT-PCR, β -actin was used as internal control for each of the tissues examined. Serial dilutions of the first strand
15 cDNAs were prepared and RT-PCR assays performed using β -actin specific primers. A dilution was then selected that enabled the linear range amplification of β -actin template, and which was sensitive enough to reflect the difference in the initial copy number. Using this condition, the β -actin levels were determined for each reverse transcription reaction from each tissue. DNA contamination was minimized by DNase
20 treatment and by assuring a negative result when using first strand cDNA that was prepared without adding reverse transcriptase.

 Using gene specific primers, the mRNA expression levels were determined in a variety of tissues. To date 32 genes have been successfully examined by RT-PCR, three of which exhibit good specificity and sensitivity for breast tumors.
25 Figures 21A and 21B depict the results for these three genes: B15AG-1 (SEQ ID NO:27), B31GA1b (SEQ ID NO:148) and B38GA2a (SEQ ID NO. 157).

 From the foregoing, it will be appreciated that, although specific embodiments of the invention have been described herein for the purpose of illustration, various modifications may be made without deviating from the spirit and
30 scope of the invention.

SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT: Corixa Corporation

(ii) TITLE OF INVENTION: COMPOSITIONS AND METHODS FOR THE
TREATMENT AND DIAGNOSIS OF BREAST CANCER

(iii) NUMBER OF SEQUENCES: 227

(iv) CORRESPONDENCE ADDRESS:

(A) ADDRESSEE: SEED and BERRY LLP
(B) STREET: 6300 Columbia Center, 701 Fifth Avenue
(C) CITY: Seattle
(D) STATE: Washington
(E) COUNTRY: USA
(F) ZIP: 98104-7092

(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk
(B) COMPUTER: IBM PC compatible
(C) OPERATING SYSTEM: PC-DOS/MS-DOS
(D) SOFTWARE: PatentIn Release #1.0. Version #1.30

(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER:
(B) FILING DATE: 10-JAN-1997
(C) CLASSIFICATION:

(vii) ATTORNEY/AGENT INFORMATION:

(A) NAME: Maki, David J.
(B) REGISTRATION NUMBER: 31.392
(C) REFERENCE/DOCKET NUMBER: 210121.419PC

(ix) TELECOMMUNICATION INFORMATION:

(A) TELEPHONE: (206) 622-4900

(B) TELEFAX: (206) 682-6031

(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 363 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 1..363

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:1:

TTA GAG ACC CAA TTG GGA CCT AAT TGG GAC CCA AAT TTC TCA AGT GGA 48
Leu Glu Thr Gln Leu Gly Pro Asn Trp Asp Pro Asn Phe Ser Ser Gly
1 5 10 15

GGG AGA ACT TTT GAC GAT TTC CAC CGG TAT CTC CTC GTG GGT ATT CAG 96
Gly Arg Thr Phe Asp Asp Phe His Arg Tyr Leu Leu Val Gly Ile Gln
20 25 30

GGA GCT GCC CAG AAA CCT ATA AAC TTG TCT AAG GCG ATT GAA GTC GTC 144
Gly Ala Ala Gln Lys Pro Ile Asn Leu Ser Lys Ala Ile Glu Val Val
35 40 45

CAG GGG CAT GAT GAG TCA CCA GGA GTG TTT TTA GAG CAC CTC CAG GAG 192
Gln Gly His Asp Glu Ser Pro Gly Val Phe Leu Glu His Leu Gln Glu
50 55 60

GCT TAT CGG ATT TAC ACC CCT TTT GAC CTG GCA GCC CCC GAA AAT AGC 240
 Ala Tyr Arg Ile Tyr Thr Pro Phe Asp Leu Ala Ala Pro Glu Asn Ser
 65 70 75 80

CAT GCT CTT AAT TTG GCA TTT GTG GCT CAG GCA GCC CCA GAT AGT AAA 288
 His Ala Leu Asn Leu Ala Phe Val Ala Gln Ala Ala Pro Asp Ser Lys
 85 90 95

AGG AAA CTC CAA AAA CTA GAG GGA TTT TGC TGG AAT GAA TAC CAG TCA 336
 Arg Lys Leu Gln Lys Leu Glu Gly Phe Cys Trp Asn Glu Tyr Gln Ser
 100 105 110

GCT TTT AGA GAT AGC CTA AAA GGT TTT 363
 Ala Phe Arg Asp Ser Leu Lys Gly Phe
 115 120

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 121 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

Leu Glu Thr Gln Leu Gly Pro Asn Trp Asp Pro Asn Phe Ser Ser Gly
 1 5 10 15

Gly Arg Thr Phe Asp Asp Phe His Arg Tyr Leu Leu Val Gly Ile Gln
 20 25 30

Gly Ala Ala Gln Lys Pro Ile Asn Leu Ser Lys Ala Ile Glu Val Val
 35 40 45

Gln Gly His Asp Glu Ser Pro Gly Val Phe Leu Glu His Leu Gln Glu
50 55 60

Ala Tyr Arg Ile Tyr Thr Pro Phe Asp Leu Ala Ala Pro Glu Asn Ser
65 70 75 80

His Ala Leu Asn Leu Ala Phe Val Ala Gln Ala Ala Pro Asp Ser Lys
85 90 95

Arg Lys Leu Gln Lys Leu Glu Gly Phe Cys Trp Asn Glu Tyr Gln Ser
100 105 110

Ala Phe Arg Asp Ser Leu Lys Gly Phe
115 120

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1101 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

TCTTAGAATC TTCATACCCC GAACTCTTGG GAAAACCTTA ATCAGTCACC TACAGTCTAC	60
CACCCATTTA GGAGGAGCAA AGCTACCTCA GCTCCTCCGG AGCCGTTTTA AGATCCCCCA	120
TCTTCAAAGC CTAACAGATC AAGCAGCTCT CCGGTGCACA ACCTGCGCCC AGGTAAATGC	180
CAAAAAAGGT CCTAAACCCA GCCCAGGCCA CCGTCTCCAA GAAAACCTAC CAGGAGAAAA	240
GTGGGAAATT GACTTTACAG AAGTAAACC ACACGGGGCT GGGTACAAAT ACCTTCTAGT	300

ACTGGTAGAC ACCTTCTCTG GATGGACTGA AGCATTTGCT ACCAAAAACG AACTGTCAA 360
TATGGTAGTT AAGTTTTTAC TCAATGAAAT CATCCCTCGA CGTGGGCTGC CTGTTGCCAT 420
AGGGTCTGAT AATGGAACGG CCTTCGCCTT GTCTATAGTT TAATCAGTCA GTAAGGCGTT 480
AAACATTCAA TGGAAGCTCC ATTGTGCCTA TCGACCCAGA GCTCTGGGCA AGTAGAACGC 540
ATGAAGTCA CCCTAAAAA AACTCTTAC AAAATTAATC TAAAAACCG GTGTTAATTG 600
TGTTAGTCTC CTCCCTTAG CCCTACTTAG AGTTAAGGTG CACCCCTTAC TGGGCTGGGT 660
TCTTTACCTT TTGAAATCAT NTTTNGGAAG GGGCTGCCTA TCTTTNCTTA ACTAAAAAN 720
GCCCATTGG CAAAAATTC NCAACTAATT TNTACGTNCC TACGTCTCCC CAACAGGTAN 780
AAAAATCTNC TGCCCTTTTC AAGGAACCAT CCCATCCATT CCTNAACAAA AGGCCTGCCN 840
TTCTTCCCC AGTTAACTNT TTTTNTTAA AATTCCCAA AAANGAACCN CCTGCTGGAA 900
AAACNCCCC CTCCAANCC CGGCCNAAGN GGAAGGTTC CTTGAATCCC NCCCCNCNA 960
ANGGCCCGA ACCNTTAAAN TNGTTCCNGG GGGTNNGGCC TAAAAGNCCN ATTTGGTAA 1020
CCTANAAATT TTTTCTTTN TAAAAACCAC NNTTTNNTT TTCTTAAACA AAACCCTNT 1080
TNTAGNANCN TATTTCCNC C 1101

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1087 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:4:

TCTAGAGCTG CGCCTGGATC CCGCCACAGT GAGGAGACCT GAAGACCAGA GAAAACACAG	60
CAAGTAGGCC CTTTAACTA CTCACCTGTG TTGTCTTCTA ATTTATTCTG TTTTATTTTG	120
TTTCCATCAT TTTAAGGGGT TAAATCATC TTGTTGAGAC CTCAGCATAT AAAATGACCC	180
ATCTGTAGAC CTCAGGCTCC AACCATACCC CAAGAGTTGT CTGGTTTTGT TTAAATTACT	240
GCCAGGTTTC AGCTGCAGAT ATCCCTGGAA GGAATATTCC AGATTCCCTG AGTAGTTTCC	300
AGGTTAAAT CCTATAGGCT TCTTCTGTTT TGAGGAAGAG TTCCTGTCAG AGAAAAACAT	360
GATTTTGGAT TTTTAACTTT AATGCTTGTG AAACGCTATA AAAAAATTT TCTACCCCTA	420
GCTTTAAAGT ACTGTTAGTG AGAAATTAAA ATTCCTTCAG GAGGATTAAA CTGCCATTTC	480
AGTTACCCTA ATTCAAATG TTTTGGTGGT TAGAATCTTC TTTAATGTTT TTGAAGAAGT	540
GTTTTATATT TTCCCATCNA GATAAATTCT CTCNCNCCTT NNTTTTNTNT CTNNTTTTTT	600
AAAACGGANT CTGCTCCGT TGCCANGCT GGAATTTT TTTTGGCCAA TCTCCGCTNC	660
CTTGCAANAA TNCTGCNTCC CAAAATTACC NCCTTTTCC CACCTCCACC CCNNGGAATT	720
ACCTGGAATT ANAGGCCCC NCCCCCCCC CGGCTAATTT GTTTTTGTTT TTAGTAAAAA	780
ACGGGTTTCC TGTTTAGTT AGGATGGCCC ANNTCTGACC CCNTNATCNT CCCCCTCNGC	840
CCTCNAATNT TNGGNNTANG GCTTACCCCC CCCNGNNGTT TTTCTCCAT TNAAATTTTC	900
TNTGGANTCT TGAATNCGG GTTTTCCCTT TTAAACCNAT TTTTTTTTTN NNNCCCCCAN	960

TTTTNCCTCC CCCNTNTNTA ANGGGGGTTT CCCAANCCGG GTCCNCCCC ANGTCCCCAA 1020
TTTTTCTCCC CCCCCCTCTT TTTTCTTNC CCCAAAANTC CTATCTTTTC CTNNAAATAT 1080
CNANTNT 1087

(2) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1010 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

TCTAGACCAA GAAATGGGAG GATTTTAGAG TGA CTGATGA TTTCTCTATC ATCTGCAGTT 60
AGTAAACATT CTCCACAGTT TATGCAAAAA GTAACAAAC CACTGCAGAT GACAAACACT 120
AGGTAACACA CATACTATCT CCCAAATACC TACCCACAAG CTCAACAATT TTAAACTGTT 180
AGGATCACTG GCTCIAATCA CCATGACATG AGGTCACCAC CAAACCATCA AGCGCTAACC 240
AGACAGAATG TTTCCACTCC TGATCCACTG TGTGGGAAGA AGCACCGAAC TTACCCACTG 300
GGGGGCCTGC NTCANAANAA AAGCCCATGC CCCC GG GTNT NCCTTTNAAC CGGAACGAAT 360
NAACCCACCA TCCCCACANC TCCTCTGTTC NTGGGCCCTG CATCTTGTGG CCTCNTNTNC 420
TTTNGGGGAN ACNTGGGGAA GGTACCCCAT TTCNTTGACC CCNCNANAAA ACCCCNGTGG 480
CCCTTTGCC TGATTNCNT GGGCCTTTTC TCTTTTCCCT TTTGGGTGT TTAAATTCCC 540
AATGTCCCN GAACCTCTC CNTNCTGCC AAAACCTACC TAAATTNCTC NCTANGNNTT 600

TTCTTGGTGI TNCTTTTCAA AGGTNACCTT NCCTGTTCAN NCCCNACNAA AATTTNTTCC 660
NTATNNTGGN CCCNNAAAAA NNNATCNCC CNAATTGCCC GAATTGGTTN GGTTTTTCCT 720
NCTGGGGGAA ACCCTTTAAA TTTCCCCCTT GGCCGGCCCC CCTTTTTTCC CCCCTTTNGA 780
AGGCAGGNGG TTCTTCCGA ACTTCCAATT NCAACAGCCN TGCCCATTCN TGAAACCCTT 840
TTCCTAAAT TAAAAAATN CCGGTTNNGG NNGGCCTCTT TCCCCTCCNG GNGGGNNGNG 900
AAANTCCTTA CCCCNAAAAA GGTGCTTAG CCCCNGTCC CCACTCCCC NGGAAAAATN 960
AACCTTTTCN AAAAAAGGAA TATAANTTN CCACTCCTTN GTTCTCTTCC 1010

(2) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 950 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

TCTAGAGCTC GCGGCCGCGA GCTCTAATAC GACTCACTAT AGGGCGTCGA CTCGATCTCA 60
GCTCACTGCA ATCTCTGCCC CCGGGGTCAT GCGATTCTCC TGCCTCAGCC TTCCAAGTAG 120
CTGGGATTAC AGGCGTGCAA CACCACACCC GGCTAATTTT GTATTTTAA TAGAGATGGG 180
GTTTTCCCTT GTTGGCCANN ATGGTCTCNA ACCCTGACC TCNNGTGATC CCCCNCNCCN 240
NGANCTCNNA CTGCTGGGGA TNNCCGNNN NNNCCTCCN NCNCHNNNNN NCNCHNTCCN 300

TNNTCCTTNC TCNNNNNNNN CNNTCNNTCC NNCTTCTCNC CNNNTTTNT CNNCNCCNN 360
CNNCCNCNT NCCCNNNNT TCNCTNCNN TNCNCCNN NTCNCCNN CNNNCNTNN 420
CCNTACNTC NTNNCNNNT CCNTCTNTN CCTCNCNT CNTCNCNT TCTCCTCN 480
NTNNNNNCT CNNNNNTCT CNTCNCNCN TNCCTCNTN NCCNCNCCC NCCTCNCNC 540
CTNNTTTNN CNNCNNNTCC NTNCCNTCN NNTCCNTNN CNNCNCNC NNCNTTNTC 600
CCNCCNTTC CTNCNCNTN NNNTNCNN CNCTCNTC NTTNCTCCT NNNTCCNCC 660
TCNNTTCNC CNNTCCNC CCCCNCCTNT CTCTNCCCN NNTNNNTNTN NNCNTCCNC 720
TNCNCNTTC NTCNNTCNT TNCNTCNC NNCNNTCNC TNCNTNTNT CTNNTCNCN 780
TCNCTNTCN CCNTCCNTN CTNCTCCTN TNCCTTCCC CTCNCTNCT CTTCCNCNC 840
CCNNTNTNTN TNNCCNNT NCTNNCNC CNTCNTTCN TCTCTNCTN NNTNNCCTC 900
NNCCNTNCC CTNNTCNC NCTNNTACN TNCNTCNC TCTCCTTCC 950

(2) INFORMATION FOR SEQ ID NO:7:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1086 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

TCTAGAGCTC GCGGCCGCGA GCTCAATTAA CCCTCACTAA AGGGAGTCGA CTCGATCAGA 60
CTGTACTGT GTCTATGTAG AAAGAAGTAG ACATAAGAGA TTCCATTTTG TTCTGTACTA 120

AGAAAAATTC TTCTGCCTTG AGATGCTGT AATCTGTAAC CCTAGCCCCA ACCCTGTGCT 180

CACAGAGACA TGTGCTGTGT TGA CTCAAGG TTCAATGGAT TTAGGGCTAT GCTTTGTAA 240

AAAAGTGCTT GAAGATAATA TGCTTGTTAA AAGTCATCAC CATTCTCTAA TCTCAAGTAC 300

CCAGGGACAC AATACTACTGC GGAAGGCCCG AGGGACCTCT GTCTAGGAAA GCCAGGTATT 360

GTCCAAGATT TCTCCCCATG TGATAGCCTG AGATATGGCC TCATGGGAAG GGTAAGACCT 420

GACTGTCCCC CAGCCCGACA TCCCCAGCC CGACATCCCC CAGCCCGACA CCCGAAAAGG 480

GTCTGTGCTG AGGAAGATTA NTAAAAGAGG AAGGCTCTTT GCATTGAAGT AAGAAGAAGG 540

CTCTGTCTCC TGCTCGTCCC TGGGCAATAA AATGTCTTGG TGTAAACCC GAATGTATGT 600

TCTACTTACT GAGAATAGGA GAAACATCC TTAGGGCTGG AGGTGAGACA CCCTGGCGGC 660

ATACTGCTCT TTAATGCACG AGATGTTTGT NTAATTGCCA TCCAGGGCCA NCCCCTTTCC 720

TTAACTTTTT ATGANACAAA AACTTTGTTT NCTTTTCTG CGAACCTCTC CCCCTATTAN 780

CCTATTGGCC TGCCCATCCC CTCCCCAAN GGTGAAANA TGTTCNTAAA TNCGAAGAA 840

TCCAAAACNT TTTCCCGTTG GTCCCTTTC CAACCCGTC CCTGGGCCNN TTTCTCCCC 900

AACNTGTCCC GGNTCCTCN TTCCNCCCC CTCCCNGAN AAAAAACCC GTNTGANGGN 960

GCCCCCTCAA ATTATAACCT TTCCNAAACA AANNGGTCN AAGGTGGTTT GNTCCGGTG 1020

CGGCTGGCCT TGAGGTCCCC CCTNCACCC AATTGGAAN CCNGTTTTTT TTATTGCCN 1080

NTCCCC 1086

(2) INFORMATION FOR SEQ ID NO:8:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1177 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

```
NCCNTTTAGA TGTGACAAN NTAAACAAGC NGCTCAGGCA GCTGAAAAA GCCACTGATA    60
AAGCATCCIG GAGTATCAGA GTTTACTGTT AGATCAGCCT CATTTGACTT CCCCTCCCAC    120
ATGGTGTTTA AATCCAGCTA CACTACTTCC TGA CTCAAAC TCCACTATTC CTGTTTCATGA    180
CTGTCAGGAA CTGTTGGAAA CTA CTGAAAC TGGCCGACCT GATCTTCAA ATGTGCCCTT    240
AGGAAAGGTG GATGCCACCG TGTTACAGA CAGTACCNC TTCCTCGAGA AGGGACTACG    300
AGGGGCCGGT GCANCTGTTA CCAAGGAGAC TNATGTGTTG TGGGCTCAGG CTTTACCANC    360
AAACACCTCA NCNCNNAAGG CTGAATTGAT CGCCCTCACT CAGGCTCTCG GATGGGGTAA    420
GGGATA1TAA CGTTAACT GACAGCAGGT ACGCCTTTC TACTGTGCAT GTACGTGGAG    480
CCATCTACCA GGAGCGTGGG CTA CTCACTC GGCAGGTGGC TGTNATCCAC GTAAANGGA    540
CATCAAAGG AAAACNNGG CTGTGCCCGT GGTAACCANA AANCTGATC NCAGCTCNAA    600
GATGCTGTGT TGA CTTCAC TCNCNCCTCT TAACTTGCT GCCCAGANTC TCCTTTCCCA    660
ACCAGATCTG CCTGACAATC CCCATACTCA AAAAAAAAAAN AANCTGGCC CCGAACCNA    720
ACCAATAAAA ACGGGGANGG TNGGTNGANC NNCCTGACCC AAAAATAATG GATCCCCCGG    780
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GCTGCAGGAA TTCAATTCAN CCTTATCNAT ACCCCCAACN NGGNGGGGGG GGCCNGTNCC 840
CATTNCCCC NTATTNATTC TTTNNCCCC CCCCCGGCNT CCTTTTNA A CTCGTGAAAG 900
GGAAACCTG NCTTACCAAN TTATCNCCTG GACCNCCCC TTCCNCGGTN GNTTANAAAA 960
AAAAGCCNC ANTCNCNTCC NAAATTTGCA CNGAAAGGNA AGGAATTTAA CCTTTATTTT 1020
TTNNTCCTTT ANTTTGTNNN CCCCCTTTTA CCCAGGCGAA CNGCCATCNT TTAANAAAAA 1080
AAANAGAANG TTTATTTTTC CTTNGAACCA TCCAATANA AANCACCCGC NGGGGAACGG 1140
GGNGGNAGGC CNCTCACCCC CTTTNTGTNG GNGGGNC 1177

(2) INFORMATION FOR SEQ ID NO:9:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1146 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

NCCNNTNNT GATGTTCTCT TTTTGGCTC TCTTTGGATA CTTTCCTCT CTCAGAGGT 60
GAAAAGGGTC AAAAGGAGCT GTTGACAGTC ATCCAGGTG GGCCAATGTG TCCAGAGTAC 120
AGACTCCATC AGTGAGGTCA AAGCCTGGGG CTTTTCAGAG AAGGGAGGAT TATGGGTTTT 180
CCAATTATAC AAGTCAGAAG TAGAAAGAAG GGACATAAAC CAGGAAGGGG GTGGAGCACT 240
CATCACCCAG AGGGACTTGT GCCTCTCTCA GTGGTAGTAG AGGGGCTACT TCCTCCCACC 300
ACGGTTGCAA CCAAGAGGCA ATGGGTGATG AGCCTACAGG GGACATANCC GAGGAGACAT 360

GGGATGACCC TAAGGGAGTA GGCTGGTTTT AAGGCGGTGG GACTGGGTGA GGGAACTCI 420
CCTCTTCTTC AGAGAGAAGC AGTACAGGGC GAGCTGAACC GGCIGAAGGT CGAGGCGAAA 480
ACACGGTCTG GCTCAGGAAG ACCTTGGAAG TAAAATTATG AATGGTGCAI GAATGGAGCC 540
ATGGAAGGGG TGCTCCTGAC CAAACTCAGC CATTGATCAA TGTTAGGGAA ACTGATCAGG 600
GAAGCCGGGA ATTCATTAA CAACCCGCCA CACAGCTTGA ACATTGTGAG GTTCAGTGAC 660
CCTTCAAGGG GCCACTCCAC TCCAACTTTG GCCATTCTAC TTTGCNAAAT TTCCAAAAC 720
TCCTTTTTTA AGGCCGAATC CNTANTCCCT NAAAAACNAA AAAAAATCTG CNCCTATTCT 780
GGAAAAGGCC CANCCCTTAC CAGGCTGGAA GAAATTTTNC CTTTTTTTTT TTTTGAAGG 840
CNTTNTTAA ATTGAACCTN AATTCNCCC CCAAAAAA AACCNCNG GGGGGCGGAT 900
TTCCAAAAC NAATTCCTT ACCAAAAAC AAAAACCNC CCTTNTCCC TTCNCCCTN 960
TTCTTTTAA TAGGGAGAGA TNAAGCCCC CAATTCNG GNCNGATNN GTTCCCCC 1020
CCCCATTT CCNAACTTT TTCCANCNA GGAANCCNC CTTTTTTNG GTCNGATTNA 1080
NCAACCTCC AAACATTT TCCNAAAAA NTTGNTNGG NGGGAAAAAN ACCTNNTTT 1140
ATAGAN 1146

(2) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 545 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

CTTCATTGGG TACGGGCCCC CTCGAGGTCG ACGGTATCGA TAAGCTTGAT ATCGAATTCC 60
TGCAGCCCGG GGGATCCACT AGTTCTAGAG TCAGGAAGAA CCACCAACCT TCCTGATTTT 120
TATTGGCTCT GAGTTCTGAG GCCAGTTTTC TTCTTCTGTT GAGTATGCGG GATTGTCAGG 180
CAGATCTGGC TGTGGAAAGG AGACTGTGGG CAGCAAGTTT AGAGGCGTGA CTGAAAGTCA 240
CACTGCATCT TGAGCTGCTG AATCAGCTTT CTGGTTACCA CGGGCAACAG CCGTGTTTTT 300
CTTTTGATGT CCTTTACAGT GGATTACAGC CACCTGCTGA GGTGAGTAGC CCACGCTCCT 360
GGTAGATGGC TCCACGTACA TGCACAGTAG CAAAGGCGTA CCTGCTGTCA GTGTTAACGT 420
TAATATCCTT ACCCCATCGG AGAGCCTGAG TGAGGGCGAT CAATTCAGCC CTTTGTGCT 480
GAGGTGTTTG CTGGTTAAGC CCTGAACCCA CAACACATCT GTCTCCATGG TAACAGCTGC 540
ACCGG 545

(2) INFORMATION FOR SEQ ID NO:11:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 196 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

TCTCCTAGGC TGGGCACAGT GGCTCATACC TGTAATCCTG ACCGTTTCAG AGGCTCAGGT 60

GGGGGGATCG CTTGAGCCCA AGATTTCAG ACTAGTCTGG GTAACATAGT GAGACCCTAT 120
CTCTACGAAA AAATAAAAAA ATGAGCCTGG TGTAGTGGCA CACACCAGCT GAGGAGGGAG 180
AATCGAGCCT AGGAGA 196

(2) INFORMATION FOR SEQ ID NO:12:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 388 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

TCTCCTAGGC TTGGGGGCTC TGACTAGAAA TTCAAGGAAC CTGGGATTCA AGTCCAAC TG 60
TGACACCAAC TTACACTGTG GNCCTCAATA AACTGCTTCT TTCCTATTCC CTCTCTATTA 120
AATAAAATAA GGAAAACGAT GTCTGTGTAT AGCCAAGTCA GNTATCCTAA AAGGAGATAC 180
TAAGTGACAT TAAATATCAG AATGTAAAC CTGGGAACCA GGTTCCTCAGC CTGGGATTAA 240
ACTGACAGCA AGAAGACTGA ACAGTACTAC TGTGAAAAGC CCGAAGNGGC AATATGTTCA 300
CTCTACCGTT GAAGGATGGC TGGGAGAATG AATGCTCTGT CCCCAGTCC CAAGCTCACT 360
TACTATACCT CCTTTATAGC CTAGGAGA 388

(2) INFORMATION FOR SEQ ID NO:13:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 337 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

TAGTAGTTGC CTAIAATCAT GTTCTCATT ATTTTCACAT TTTATTAACC AATITCTGTT	60
TACCCTGAAA AATATGAGGG AAATATATGA AACAGGGAGG CAATGTTICAG ATAATTGATC	120
ACAAGATATG ATTTCTACAT CAGATGCTCT TTCCTTTCCT GTTTATTTCC TTTTATTTTC	180
GGTTGTGGGG TCGAATGTAA TAGCTTTGTT TCAAGAGAGA GTTTTGGCAG TTTCTGTAGC	240
TTCTGACACT GCTCATGTCT CCAGGCATCT ATTTGCACTT TAGGAGGTGT CGTGGGAGAC	300
TGAGAGGTCT ATTTTTTCCA TATTTGGGCA ACTACTA	337

(2) INFORMATION FOR SEQ ID NO:14:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 571 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

TAGTAGTTGC CATAAGTGC CTTTCCATTT ATTTAACCCC CACCTGAACG GCATAAACTG	60
AGTGTTGAGC TGGTGTGTTT TACTGTAAAC AATAAGGAGA CTTTGCTCTT CATTTAAACC	120
AAAATCATAT TTCATATTTT ACGCTCGAGG GTTTTACCG GTTCCTTTT ACACCTCTTA	180

AAACAGTTTT TAAGTCGTTT GGAACAAGAT ATTTTCTT TCCTGGCAGC TTTAACATT 240
ATAGCAAATT TGTGCTGGG GGACTGCTGG TCACTGTTT TCACAGTTGC AAATCAAGGC 300
ATTTGCAACC AAGAAAAAA AATTTTTTTG TTTTATTGA AACTGGACCG GATAAACGGT 360
GTTTGGAGCG GCTGCTGTAT ATAGTTTAA ATGGTTTATT GCACCTCCTT AAGTTGCACT 420
TATGTGGGGG GGGGNTTTG NATAGAAAGT NTTTANTCAC ANAGTCACAG GGACTTTNT 480
CTTTTGGNNA CTGAGCTAAA AAGGGCTGNT TTTGGGTGG GGGCAGATGA AGGCTCACAG 540
GAGGCCTTTC TCTTAGAGGG GGGAACNCT A 571

(2) INFORMATION FOR SEQ ID NO:15:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 548 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

TATATATTTA ATAACCTAAA TATATTTTGA TCACCCACTG GGGTGATAAG ACAATAGATA 60
TAAAAGTATT TCCAAAAAGC ATAAACCAA AGTATCATAC CAAACCAAAT TCATACTGCT 120
TCCCCACCC GCACTGAAAC TTCACCTTCT AACTGTCTAC CTAACCAAAT TCTACCTTC 180
AAGTCTTTGG TCGTGCTCA CTACTCTTTT TTTTTTTTTT TTTNTTTTGG AGATGGAGTC 240
TGGCTGTGCA GCCCAGGGGT GGAGTACAAT GGCACAACCT CAGCTCACTG NAACCTCCGC 300
CTCCCAGGTT CATGAGATTC TCCTGNTTCA GCCTTCCCAG TAGCTGGGAC TACAGGTGTG 360

CATCACCATG CCTGGNTAAT CTTTTTTNGT TTTNGGGTAG AGATGGGGGT TTTACATGTT 420
GGCCAGGNIG GTNTCGAACT CCTGACCTCA AGTGATCCAC CCACCTCAGG CTCCCAAAGT 480
GCTAGGATTA CAGACATGAG CCACTGNGCC CAGNCCTGGT GCATGCTCAC TTCTCTAGGC 540
AACTACTA 548

(2) INFORMATION FOR SEQ ID NO:16:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 638 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

TTCCGTTATG CACATGCAGA ATATTCTATC GGTACTTCAG CTATTACTCA TTTTGATGGC 60
GCAATCCGAG CCTATCCTCA AGATGAGTAT TTAGAAAGAA TTGATTTAGC GATAGACCAA 120
GCTGGTAAGC ACTCTGACTA CACGAAATTG TTCAGATGTG ATGGATTTAT GACAGTTGAT 180
CTTTGGAAGA GATTATTAAG TGATTATTTT AAAGGGAATC CATTAAATCC AGAATATCTT 240
GGTTTAGCTC AAGATGATAT AGAAATAGAA CAGAAAGAGA CTACAAATGA AGATGTATCA 300
CCAACTGATA TTGAAGAGCC TATAGTAGAA AATGAATTAG CTGCATTTAT TAGCCTTACA 360
CATAGCGATT TTCCTGATGA ATCTTATATT CAGCCATCGA CATAGCATTG CCTGATGGGC 420
AACCTTACGA ATAATAGAAA CTGGGTGCGG GGCTATTGAT GAATTCATCC NCAGTAAATT 480

TGGATATNAC AAAATATAAC TCGATTGCAT TTGGATGATG GAATACTAAA TCTGGCAAAA 540
GTAAC TTTGG AGCTACTAGT AACCTCTCTT TTTGAGATGC AAAATTTTCT TTTAGGGTTT 600
CTTATTCTCT ACTTTACGGA TATTGGAGCA TAACGGGA 638

(2) INFORMATION FOR SEQ ID NO:17:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 286 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

ACTGATGGAT GTCGCCGAG GCGAGGGGCC TTATCTGATG CTCGGCTGCC TGTCGTGAT 60
GTGCGCGGCG ATTGGGCTGT TTATCTCAA CACCGCCACG GCGGTGCTGA TGGCGCCTAT 120
TGCCTTAGCG GCGGCGAAGT CAATGGGCGT CTCACCTAT CCTTTTGCCA TGGTGGTGGC 180
GATGGCGGCT TCGCGGCGT TTATGACCCC GGTCTCTCG CCGGTTAACA CCCTGGTGCT 240
TGGCCCTGGC AAGTACTCAT TTAGCGATTT TGTCAAAATA GGCGTG 286

(2) INFORMATION FOR SEQ ID NO:18:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 262 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

TCGGTCATAG CAGCCCCTTC TTCTCAATTT CATCTGTCAC TACCCTGGTG TAGTATCTCA 60
TAGCCTTACA TTTTATAGC CTCCTCCCTG GTCTGTCTTT TGATTTTCTT GCCTGTAATC 120
CATATCACAC ATAACTGCAA GTAAACATTT CTAAAGTGTG GTTATGCTCA TGCACTCCT 180
GTGNCAGAA ATAGTTTCCA TTACCGTCTT AATAAAATTC GGATTTGTTT TTNCTATTN 240
TCACTCTTCA CCTATGACCG AA 262

(2) INFORMATION FOR SEQ ID NO:19:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 261 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

TCGGTCATAG CAAAGCCAGT GGTTTGAGCT CTCTACTGTG TAAACTCCTA AACCAAGGCC 60
ATTTATGATA AATGGTGGCA GGATTTTAT TATAACATG TACCCATGCA AATTCCTAT 120
AACTCTGAGA TATATTCTT TACATTTAAA CAATAAAAT AATCTATTTT TAAAAGCCTA 180
ATTTGCGTAG TTAGGTAAGA GTGTTTAATG AGAGGGTATA AGGTATAAAT CACCAGTCAA 240
CGTTTCTCTG CCTATGACCG A 261

(2) INFORMATION FOR SEQ ID NO:20:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 294 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:20:

```
TACAACGAGG CGACGTCGGT AAAATCGGAC ATGAAGCCAC CGCTGGTCTT TTCGTCCGAG      60
CGATAGGCGC CGGCCAGCCA GCGGAACGGT TGCCCGGATG GCGAAGCGAG CCGGAGTTCT      120
TCGGACTGAG TATGAATCTT GTTGTGAAAA TACTCGCCGC CTTCGTTCTGA CGACGTCGCG      180
TCGAAATCTT CGANCTCCTT ACGATCGAAG TCTTCGTGGG CGACGATCGC GGTCAGTTCC      240
GCCCCACCGA AATCATGGTT GAGCCGGATG CTGNCCCCGA AGNCCTCGTT TGTN          294
```

(2) INFORMATION FOR SEQ ID NO:21:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 208 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

```
TTGGTAAAGG GCATGGACGC AGACGCCTGA CGTTTGGCTG AAAATCTTTC ATTGATTCGT      60
ATCAATGAAT AGGAAAATTC CCAAAGAGGG AATGTCCTGT TGCTCGCCAG TTTTNTGTI      120
GTTCTCAIGG ANAAGGCAAN GAGCTCTTCA GACTATTGGN ATTNTCGTTC GGTCTTCTGC      180
CAACTAGTCG NCTTGCAANG ATCTTCAT          208
```

(2) INFORMATION FOR SEQ ID NO:22:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 287 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

```
NCCNTTGAGC TGAGTGATTG AGATNTGTAA TGGTTGTAAG GGTGATTCAG GCGGATTAGG      60
GTGGCGGGTC ACCCGGCAGT GGGTCTCCCG ACAGGCCAGC AGGATTTGGG GCAGGTACGG      120
NGTGCGCATC GCTCGACTAT ATGCTATGGC AGGCGAGCCG TGAAGGNGG ATCAGGTCAC      180
GGCGCTGGAG CTTTCCACGG TCCATGNATT GNGATGGCTG TTCTAGGCGG CTGTTGCCAA      240
GCGTGATGGT ACGCTGGCTG GAGCATTGAT TTCTGGTGCC AAGGTGG                      287
```

(2) INFORMATION FOR SEQ ID NO:23:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 204 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

```
TTGGGTAAAG GGAGCAAGGA GAAGGCATGG AGAGGCTCAN GCTGGTCCTG GCCTACGACT      60
GGGCCAAGCT GTCGCCGGGG ATGGTGGAGA ACTGAAGCGG GACCTCCTCG AGGTCCTCCG      120
```

NCGTTACTTC NCCGTCCAGG AGGAGGGTCT TTCCGTGGTC TNGGAGGAGC GGGGGGAGAA 180

GATNCTCCTC ATGGTCNACA TCCC 204

(2) INFORMATION FOR SEQ ID NO:24:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 264 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

TGGATTGGTC AGGAGCGGGT AGAGTGGCAC CATTGAGGGG ATATTCAAAA ATATTATTTT 60

GTCCTAAATG ATAGTTGCTG AGTTTTTCTT TGACCCATGA GTTATATTGG AGTTTATTTT 120

TTAACTTTCC AATCGCATGG ACATGTTAGA CTTATTTTCT GTTAATGATT NCTATTTTTA 180

TTAAATGGGA TTTGAGAAAT TGGTTNTTAT TATATCAATT TTTGGTATTT GTTGAGTTTG 240

ACATTATAGC TTAGTATGTG ACCA 264

(2) INFORMATION FOR SEQ ID NO:25:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 376 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

TTACAACGAG GGGAACTCC GTCTCTACAA AAATTAAAAA ATTAGCCAGG TGTGGTGGTG 60
TGCACCCGCA ATCCCAGCTA CTTGGGAGGT TGAGACACAA GANTCACCTA NATGTGGGAG 120
GTCAAGGTTG CATGAGTCAT GATTGTGCCA CTGCACTCCA GCCTGGGTGA CAGACCGAGA 180
CCCTGCCTCA ANAGANAANG AATAGGAAGT TCAGAAATCN TGGNTGTGGN GCCCAGCAAT 240
CTGCATCTAT NCAACCCCTG CAGGCAANGC TGATGCAGCC TANGTTCAAG AGCTGCTGTT 300
TCTGGAGGCA GCAGTTNGGG CTTCCATCCA GTATCACGGC CACACTCGCA CNAGCCATCT 360
GTCCCTCCGTN TGTNAC 376

(2) INFORMATION FOR SEQ ID NO:26:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 372 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

TTACAACGAG GGGAACTCC GTCTCTACAA AAATTAAAAA ATTAGCCAGG TGTGGTGGTG 60
TGCACCTGTA ATCCCAGCTA CTTGGGCGGC TGAGACACAA GAACCACCTA AATGTGGGAG 120
GGTCAAGGTT GCATGAGTCA TGATCGCGCC ACTGCACTCC AGCCTGGGTG ACAGACTGAG 180
ACCCTGCCTC AAAAGAAAAA GAATAGGAAG TTCAGAAACC CTGGGTGTGG NGCCAGCAA 240
TCTGCATTTA AACATCCCT GCAGGCAATG CTGATGCAGC CTAAGTTCAA GAGCTGCTGT 300

TCTGGAGGCA GNAGTAAGGG CTTCCATCCA GCATCACGGN CAACACTGCA AAAGCACCTG 360

TCCTCGTTGG TA 372

(2) INFORMATION FOR SEQ ID NO:27:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 477 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:27:

TTCTGTCCAC ATCTACAAGT TTTATTTATT TTGTGGGTTT TCAGGGTGAC TAAGTTTTTC 60
CCTACATTGA AAAGAGAAGT TGCTAAAAGG TGCACAGGAA ATCATTTTTT TAAGTGAATA 120
TGATAATATG GGTCCGTGCT TAATACAAC T GAGACATATT TGTTCTCTGT TTTTITAGAG 180
TCACCTCTTA AAGTCCAATC CCACAATGGT GAAAAAAAA TAGAAAGTAT TTGTTCTACC 240
TTTAAGGAGA CTGCAGGGAT TCTCCTTGAA AACGGAGTAT GGAATCAATC TTAATAAAI 300
ATGAAATTGG TTGGTCTTCT GGGATAAGAA ATTCCCAACT CAGTGTGCTG AAATTCACCT 360
GACTTTTTTT GGGAAAAAAT AGTCGAAAAT GTCAATTGG TCCATAAAAT ACATGTTACT 420
ATTAAAGAT ATTTAAAGAC AAATTCTTTC AGAGCTCTAA GATTGGTGTG GACAGAA 477

(2) INFORMATION FOR SEQ ID NO:28:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 438 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

TCTNCAACCT CTTGANTGTC AAAACCTTN TAGGCTATCT CTAAGCTG ACTGGTATTC	60
ATTCCAGCAA AATCCCTCTA GTTTTGGAG TTTCTTTTA CTATCTGGG CTGCCTGAGC	120
CACAAATGCC AAATTAAGAG CATGGCTATT TTCGGGGCT GACAGGTCAA AAGGGGTGTA	180
AATCCGATAA GCCTCCTGGA GGTGCTCTAA AAACACTCCT GGTGACTCAT CATGCCCTG	240
GACGACTTCA ATCGNCTTAG ACAAGTTTAT AGGTTTCTGG GCAGCTCCCT GAATACCCAC	300
GAGGAGATAC CGGTGGAAAT CGTCAAAGT TCTCCCTCCA CTTGAGAAAT TTGGGTCCCA	360
ATTAGGTCCC AATTGGGTCT CTAATCACTA TTCCTCTAGC TTCCTCCTCC GGNCTATTGG	420
TTGATGTGAG GTTGAAGA	438

(2) INFORMATION FOR SEQ ID NO:29:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 620 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

AAGAGGTAC CAGCCCCAAG CCTTGACAAC TTCCATAGG TGCAAGCCT GTGGGTGCAC	60
AGAAGTCAAA AATTGAGTTT TGGGATCCTC AGCCTAGATT TCAGAGGATA TAAAGAAACA	120

CCTAACACCT AGATATTCAG ACAAAGTTT ACTACAGGGA TGAAGCTTTC ACGGAAAACC 180
TCTACTAGGA AAGTACAGAA GAGAAATGTG GGTTCGGAGC CCCCACAG AATCCCTCT 240
AGAACACTGC CTAATGAAAC TGTGAGAAGA TGGCCACTGT CATCCAGACA CCAGAATGAT 300
AGACCCACCA AAACTTATG CCATATTGCC TATAAACCT ACAGACACTC AATGCCAGCC 360
CCATGAAAAA AAACTGAGA AGAAGACTGT NCCCTACAAT GCCACCGGAG CAGAACTGCC 420
CCAGGCCATG GAAGCACAGC TCTTATATCA ATGTGACCTG GAIGTTGAGA CATGGAATCC 480
NANGAAATCN TTTTAANACT TCCACGGTTN AATGACTGCC CTATTANATT CNGAACTAN 540
ATCCNNGCCT GTGACCTCTT TGCTTTGGCC ATTCCCCCTT TTTGGAATGG CTNTTTTTTT 600
CCCATGCCTG TNCCTCTTA 620

(2) INFORMATION FOR SEQ ID NO:30:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 100 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

TTACAACGAG GGGGTCAATG TCATAAATGT CACAATAAAA CAATCTCTTC TTTTTTTTTT 60
TTTTTTTTTT TTTTTTTTTT TTTTTTTTTT TTTTTTTTTT 100

(2) INFORMATION FOR SEQ ID NO:31:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 762 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:31:

```
TAGTCTATGC GCCGGACAGA GCAGAATTAA ATTGGAAGTT GCCCTCCGGA CTTTCTACCC    60
ACACTCTTCC TGAAAAGAGA AAGAAAAGAG GCAGGAAAGA GGTTAGGATT TCATTTTCAA    120
GAGTCAGCTA ATTAGGAGAG CAGAGTTTAG ACAGCAGTAG GCACCCCATG ATACAAACCA    180
TGGACAAAGT CCCTGTTTAG TAACTGCCAG ACATGATCCT GCTCAGGTTT TGAAATCTCT    240
CTGCCCATAA AAGATGGAGA GCAGGAGTGC CATCCACATC AACACGTGTC CAAGAAAGAG    300
TCTCAGGGAG ACAAGGGTAT CAAAAACAA GATTCTTAAT GGGAAGGAAA TCAAACCAAA    360
AAATTAGATT TTTCTCTACA TATATATAAT ATACAGATAT TTAACACAAT ATTCCAGAGG    420
TGGCTCCAGT CTTTGGGGCT TGAGAGATGG TGAAACTTT TGTTCCACAT TAACTTCTGC    480
TCTCAAATTC TGAAGTATAT CAGAATGGGA CAGGCAATGT TTTGCTCCAC ACTGGGGCAC    540
AGACCCAAAT GGTTCGTGTC CCGAAGAAGA GAAGCCCGAA AGACATGAAG GATGCTTAAG    600
GGGGGTGGG AAAGCCAAAT TGGTANTATC TTTTCTCCT GCCTGTGTTT CNGAAGTCTC    660
CNCTGAAGGA ATTCTTAAAA CCCTTTGTGA GGAAATGCCC CCTTACCATG ACAANTGGTC    720
CCATTGCTTT TAGGGNGATG GAAACACCAA GGGTTTTGAT CC                          762
```

(2) INFORMATION FOR SEQ ID NO:32:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 276 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:32:

```
TAGTCTATGC GTGTATTAAC CTCCCCTCCC TCAGTAACAA CCAAAGAGGC AGGAGCTGTT    60
ATTACCAACC CCATTTIACA GATGCATCAA TAATGACAGA GAAGTGAAGT GACTTGCGCA    120
CACAACCAGT AAATTGGCAG AGTCAGATTT GAATCCATGG AGTCTGGTCT GCACTTTCAA    180
TCACCGAATA CCCTTTCTAA GAAACGTGTG CTGAATGAGT GCATGGATAA ATCAGTGTCT    240
ACTCAACATC TTGCCTAGA TATCCCGCAT AGACTA                                276
```

(2) INFORMATION FOR SEQ ID NO:33:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 477 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:33:

```
TAGTAGTTGC CAAATATTTG AAAATTTACC CAGAAGTGAT TGAAACTTT TTGGAACAA    60
AAACAAATAA AGCCAAAAGG TAAATAAAA ATATCTTTGC ACTCTCGTTA TTACCTATCC    120
ATAACTTTTT CACCGTAAGC TCTCCTGCTT GTTAGTGTAG TGTGGTTATA TTAACTTTT    180
```

TAGTTATTAT TTTTATTCA CTTTCCACT AGAAGTCAT TATTGATTTA GCACACATGT 240
TGATCTCATT TCATTTTTTC TTTTATAGG CAAATTTGA TGCTATGCAA CAAAAATACT 300
CAAGCCCATT ATCTTTTTTC CCCCCGAAAT CTGAAATTG CAGGGGACAG AGGGAAGTTA 360
TCCCATTAAM AAATTGTAA TATGTCAGT TTATGTTAA AAATGCACAA AACATAAGAA 420
AATTGTGTTT ACTTGAGCTG CTGATTGTAA GCAGTTTAT CTCAGGGGCA ACTACTA 477

(2) INFORMATION FOR SEQ ID NO:34:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 631 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:34:

TAGTAGTTGC CAATTCAGAT GATCAGAAAT GCTGCTTCC TCAGCATTGT CTTGTAAAC 60
CGCATGCCAT TTGGAACCTT GGCAGTGAGA AGCCAAAAGG AAGAGGTGAA TGACATATAT 120
ATATATATAT ATTCAATGAA AGTAAATGT ATATGCTCAT ATACTTTCTA GTTATCAGAA 180
TGAGTTAAGC TTTATGCCAT TGGGCTGCTG CATATTTTAA TCAGAAGATA AAAGAAAATC 240
TGGGCATTTT TAGAATGTGA TACATGTTTT TTAAAACTG TTAAATATTA TTTCGATATT 300
TGTCTAAGAA CCGGAATGTT CTAAATTT ACTAAACAG TATTGTTTGA GGAAGAGAAA 360
ACTGTACTGT TTGCCATTAT TACAGTCGTA CAAGTGCATG TCAAGTCACC CACTCTCTCA 420

GGCATCAGIA TCCACCTCAT AGCTTTACAC ATTTTGACGG GGAATATTGC AGCATCCTCA 480
GGCCTGACAT CTGGGAAAGG CTCAGATCCA CCTACTGCTC CTTGCTCGTT GATTGTGTTT 540
AAAATATIGT GCCTGGTGTC ACTTTTAAGC CACAGCCCTG CCTAAAAGCC AGCAGAGAAC 600
AGAACCCGCA CCATTCTATA GGCAACTACT A 631

(2) INFORMATION FOR SEQ ID NO:35:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 578 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:35:

TAGTAGTTGC CATCCCATAT TACAGAAGGC TCTGTATACA TGAATTATTT GGAAGTGATC 60
TGTTTTCTCT CCAAACCCAT TTATCGTAAT TTCACCAGTC TTGGATCAAT CTTGGTTTCC 120
ACTGATACCA TGAACCTAC TTGGAGCAGA CATTGCACAG TTTTCTGTGG TAAAACTAA 180
AGGTTTATTT GCTAAGCTGT CATCTTATGC TTAGTATTTT TTTTACAG TGGGAATTG 240
CTGAGATTAC ATTTTGTTAT TCATTAGATA CTTTGGGATA ACTTGACACT GTCTTCTTTT 300
TTTCGCTTTT AATTGCTATC ATCATGCTTT TGAAACAAGA ACACATTAGT CCTCAAGTAT 360
TACATAAGCT TGCTTGTTAC GCCTGGTGGT TAAAGGACT ATCTTTGGCC TCAGGTTAC 420
AAGAATGGGC AAAGTGTTC CTTATGTCT GTAGTTCTCA ATAAAAGATT GCCAGGGGCC 480
GGTACTGTG GCTCGCACTG TAATCCCAGC ACTTTGGGAA GCTGAGGCTG GCGGATCATG 540

TTAGGGCAGG TGTTCGAAAC CAGCCTGGGC AACTACIA

578

(2) INFORMATION FOR SEQ ID NO:36:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 583 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:36:

TAGTAGTTGC CTGTAATCCC AGCAACTCAG GAGGCTGGGG CAGGAGAATC AGTTGAACCT	60
GGGAGGCAGA AGTTGTAATT AGCAAAGATC GCACCATTGC ACTTCAGCCT GGGCAACAAG	120
AGTGAGATTC CATCTCAAAA ACAAAAAAAAA GAAAAAGAAA AGAAAAGGAA AAAACGTATA	180
AACCCAGCCA AAACAAATG ATCATTCTTT TAATAAGCAA GACTAATTTA ATGTGTTTAT	240
TTAATCAAAG CAGTTGAATC TTCTGAGTTA TTGGTGAAAA TACCCATGTA GTTAATTTAG	300
GGTTCTTACT TGGGTGAACG TTTGATGTTT ACAGGTTATA AAATGGTTAA CAAGGAAAAT	360
GATGCATAAA GAATCTTATA AACTACTAAA AATAAATAAA ATATAAATGG ATAGGTGCTA	420
TGGATGGAGT TTTTGTGTA TTTAAATCT TGAAGTCATT TTGGATGCTC ATTGGTTGTC	480
TGGTAATTTT CATTAGGAAA AGGTTATGAT ATGGGGAAAC TGTTTCTGGA AATTGCGGAA	540
TGTTTCTCAT CTGTAAAATG CTAGTATCTC AGGGCAACTA CTA	583

(2) INFORMATION FOR SEQ ID NO:37:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 716 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:37:

GATCTACTAG TCATNTGGAT TCTATCCATG GCAGCTAAGC CTTTCTGAAT GGATTCTACT	60
GCTTTCTTGT TCTTTAATCC AGACCCCTTAT ATATGTTTAT GTTCACAGGC AGGGCAATGT	120
TTAGTGAAAA CAATTCTAAA TTTTATTATT TGCATTTTCA TGCTAATTTC CGTCACACTC	180
CAGCAGGCTT CCTGGGAGAA TAAGGAGAAA TACAGCTAAA GACATTGTCC CTGCTTACTT	240
ACAGCCTAAT GGTATGCAAA ACCACTTCAA TAAAGTAACA GGAAAAGTAC TAACCAGGTA	300
GAATGGACCA AACTGATAT AGAAAAATCA GAGGAAGAGA GGAACAAATA TTTACTGAGT	360
CCTAGAATGT ACAAGGCTTT TTAATTACAT ATTTTATGTA AGGCCTGCAA AAAACAGGTG	420
AGTAATCAAC ATTTGTCCCA TTTTACATAT AAGGAAACIG AAGCTTAAAT TGAATAATTT	480
AATGCATAGA TTTTATAGTT AGACCATGTT CAGGTCCTTA TGTATACTT ACTAGCTGTA	540
TGAATATGAG AAAATAATTT TGTATTTTC TTGGCATCAG TATTTTCAIC TGCAAAATAA	600
AGCTAAAGTT ATTTAGCAAA CAGTCAGCAT AGTGCCTGAT ACATAGTAGG TGCTCCAAAC	660
ATGATTACNC TANTATNGG TATTANAAAA ATCCAATATA GGCNTGGATA AAACCG	716

(2) INFORMATION FOR SEQ ID NO:38:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 688 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:38:

```
TTCTGTCCAC ATATCATCCC ACTTTAATTG TTAATCAGCA AAACTTTCAI TGAAAAATCA    60
TCCATTTTAA CCAGGATCAC ACCAGGAAAC TGAAGGTGTA TTTTTTTTCT CCTTAAAAAA    120
AAAAAAAAAA ACCAAACAAA CCAAAACAGA TTAACAGCAA AGAGTTCTAA AAAATTTACA    180
TTTCTCTTAC AACTGTCATT CAGAGAACAA TAGTTCTTAA GTCTGTATAA TCTTGGCATT    240
AACAGAGAAA CTTGATGAAN AGTTGTACTT GGAATATTGT GGATTTTTTT TTTTGTCTAA    300
TCTCCCCCTA TTGTTTTGCC AACAGTAATT TAAGTTTGTG TGGAACATCC CCGTAGTTGA    360
AGTGTAACA ATGTATAGGA AGGAATATAT GATAAGATGA TGCATCACAT ATGCATTACA    420
TGTAGGGACC TTCACAACCT CATGCACTCA GAAAACATGC TTGAAGAGGA GGAGAGGACG    480
GCCCAGGGTC ACCATCCAGG TGCCTTGAGG ACAGAGAATG CAGAAGTGGC ACTGTTGAAA    540
TTTAGAAGAC CATGTGTGAA TGGTTTCAGG CCTGGGATGT TTGCCACCAA GAAGTGCCTC    600
CGAGAAATTT CTTTCCCAT TGAATACAG GGTGGCTTGA TGGGTACGGT GGGTGACCCA    660
ACGAAGAAAA TGAAATTCTG CCCTTTCC                                     688
```

(2) INFORMATION FOR SEQ ID NO:39:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 585 base pairs

- (B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:39:

TAGTAGTTGC CCCNNACCTA AAANTTGGAA AGCATGATGT CTAGGAAACA TANTAAAAIA	60
GGGTATGCCT ATGTGCTACA GAGAGATGTT AGCATTTAAA GTGCATANTT TTATGTATTI	120
TGACAAATGC ATATNCCTCT ATAATCCACA ACTGATTACG AAGCIATTAC AATTAAAAAG	180
TTTGGCCGGG CGTGGTGGG GGTGGCTGAC GCCTGTAATC CCAGCACTTI GGGAGGCCGA	240
GGCAGCGCGA TCACGAGGTC GGGAGTTCAA GACCATCCTG GCTAACACGG TGAAAGTCCA	300
TCTCTACTAA AAATACGAAA AAATTACCCC GGCCTGGTGG CGGGCGCCTG TAGTCCCAGC	360
TACTCCGGAG GCTGAGGCAG GAGAATGGCG TGAACCCAGG ACACGGAGCT TGCAGTGTGC	420
CAACATCAG TCACTGCCCT CCAGCCTGGG GGACAGGAAC AAGANTCCCG TCCTCANAAA	480
AGAAAAATAC TACTNATANT TTCNACTTTA TTTTAANTTA CACAGAACTN CCTCTTGTA	540
CCCCCTTACC ATTCATCTCA CCCACCTCCT ATAGGGCACN NCTAA	585

(2) INFORMATION FOR SEQ ID NO:40:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 475 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:40:

TCTGTCCACA CCAATCTTAG AAGCTCTGAA AAGAATTTGT CTTTAAATAT CTTTAAATAG	60
TAACATGTAT TTTATGGACC AAATTGACAT TTTCGACTGT TTTTCCAAA AAAGTCAGGT	120
GAATTTGAGC AACTGAGTT GGAATTTCT TATCCAGAA GACCAACCA TTTTCATATT	180
ATTTAAGATT GATTCCATAC TCGTTTTCA AGGAGAAICC CTGCAGTCTC CTAAAGGTA	240
GAACAAATAC TTCCTATTTT TTTTCCACCA TTGTGGGATT GGACTTTAAG AGGTGACTCT	300
AAAAAACAG AGAACAAATA TGTCTCAGTT GTATTAAGCA CGGACCCATA TTATCATATT	360
CACTTAAAAA AATGATTTCC TGTGCACCTT TTGGCAACTT CTCTTTTCAA TGAGGGAAA	420
AACTTAGTCA CCCTGAAAAC CCACAAATA AATAAACTT GTAGATGTGG ACAGA	475

(2) INFORMATION FOR SEQ ID NO:41:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 423 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:41:

TAAGAGGGTA CATCGGGTAA GAACGTAGGC ACATCTAGAG CTTAGAGAAG TCTGGGGTAG	60
GAAAAAATC TAAGTATTTA TAAGGTATA GGTAACATTT AAAAGTAGGG CTAGCTGACA	120
TTATTTAGAA AGAACACATA CGGAGAGATA AGGGCAAAGG ACTAAGACCA GAGGAACACT	180
AATATTTAGT GATCACTTCC ATTCTTGGTA AAAATAGTAA CTTTAAAGTT AGCTTCAAGG	240

AAGATTTTGG GCCATGATTA GTTGTCAAAA GTTAGTTCTC TTGGGTTTAT ATTACTAATT 300
TTGTTTAAAG ATCCTTGTTA GTGCTTTAAT AAAGTCATGT TATATCAAAC GCTCTAAAAC 360
ATTGTAGCAT GTTAAATGTC ACAATATACT TACCATTTGT TGTATATGGC TGTACCCTCT 420
CTA 423

(?) INFORMATION FOR SEQ ID NO:42:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 527 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:42:

TCICCTAGGC TAATGTGTGT GTTCTGTAA AAGTAAAAAG TAAAAATTT TAAAAATAGA 60
AAAAAGCTTA TAGAATAAGA ATATGAAGAA AGAAAATATT TTTGTACATT TGCACAATGA 120
GTTTATGTTT TAAGCTAAGT GTTATTACAA AAGAGCCAAA AAGGTTTTAA AAATTA AAC 180
GTTTGTAAG TTACAGTACC CTTATGTAA TTTATAATTG AAGAAAGAAA AACTTTTTTT 240
TATAAATGTA GTGTAGCCTA AGCATACAGT ATTTATAAAG TCTGGCAGTG TTCAATAATG 300
TCCTAGGCCT TCACATTCAC TCACTGACTC ACCCAGAGCA ACTTCCAGTC CTGTAAGCTC 360
CATTCGTGGI AAGTGCCTA TACAGGTGCA CCATTTATIT TACAGTATTT TTACTGTACC 420
TTCTCTATGT TTCCATATGT TTCGATATAC AAATACCACT GGTACTATN GCCCNACAGG 480

TAATTCAGT AACACGGCCT GTATACGTCT GGTANCCCTA GNGAAGA 527

(2) INFORMATION FOR SEQ ID NO:43:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 331 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:43:

TCTTCAACCT CGTAGGACAA CTCTCATATG CCTGGGCACT ATTTTtagGT TACTACCTTG 60
GCTGCCCTTC TTTAAGAAAA AAAAAGAAG AAAAAGAAC TTTCCACAA GTTCTCTTC 120
CTCTAGTTGG AAAATTAGAG AAATCATGTT TTTAATTTTG TGTATTICA GATCACAAAT 180
TCAAACACTT GTAAACATTA AGCTTCTGTT CAATCCCCTG GGAAGAGGAT TCATTCTGAT 240
ATTTACGGTT CAAAAGAAGT TGTAATATTG TGCTTGAAC ACAGAGACC AGTTATTAAC 300
TTCCTACTAC TATTATATAA TAAATAATAA C 331

(2) INFORMATION FOR SEQ ID NO:44:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 592 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:44:

GGCTTAGTAG TTGCCAGGCA AAATARCGTT GATTCTCCTC AGGAGCCACC CCCAACACCC 60
CTGTTTGCTT CTAGACCIAT ACCTAGACTA AAGTCCCAGC AGACCCCTAG AGGTGAGGT 120
CAGAGTGACC CTTGAGGAGA TGTGCTACAC TAGAAAAGAA CTGCTTGAGT TTTCTAATTT 180
ATATAAGCAG AAATCTGGAG AAGAGTCATA GGAATGGATA TTAAGGGTGT GAGATAATGG 240
CGGAAGGAAT ATAGAGTTGG ATCAGGCTGG ACTTATTGAT TTGAACCCAC TAAGTAGAGA 300
TTCTGCTTTT GATGTTGCAG CTCAGGGAGT TAAAAAAGGT TTTAATGGTT CTAATAGTTT 360
ATTGCTTGG TTAGCTGAAA TATGGATAAA AGATGGCCCA CTGTGAGCAA GCTGGAAATG 420
CCTGATCTCT CTCAGTTTAA TGTAAGAGAA GGGATCCAAA AGTTTAGGGA GANTTGGATG 480
CTGGRAKTGG ATTGGTCACT TTGRGACCTA CCCWTCCCAG CIGGGAGGGT CCAGAAGATA 540
CACCCCTGAC CAACGCTTTG CGAAATGGAT TTGTGATGCC GGCAACTACT AA 592

(2) INFORMATION FOR SEQ ID NO:45:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 567 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:45:

GGCTTAGTAG TTGCCATTGC GAGTGCTTGC TCAACGAGCG TTGAACATGG CGGATTGTCT 60
AGATTCAACG GATTTGAGTT TTACCAGCAA AGCGAACCAA GCGCGGCCCA GAGAATTATG 120
GGTTGGTTGG CTTTGAAAAG ATGGAAATCC TGTAGGCCTA GTCAGAAAAG CCTTCTTGCA 180

GAACAGTTGG TTCTCGGGCG AACGCTCATC AAGATGCCCC TTGGAAAGGC TAGCGTGTAT 240
TTGGGAGAGC CTGATAGCGT GTCTTCTGAT GATGTTTGTG CTTGGACAGT GACAAAAGAT 300
ATGCAAAGCA AGTCCGAAGT AGACGTCAAG CTCGTGAGC AAATTATTGT AGACTCCTAC 360
TTATACTGTG AGGAATGATA GCCAAGGGTG GGGACTTTAA GACTAAGGTG GTTTGTAAT 420
GCGCCGATGA TCCCAGGCAG AAAGAMCTGA TCGCTAGTTT TATACGGGCA ACTACTAAGC 480
CGAATTCAG CACACTGGCG GCCGTTACTA ATTGGATCCG ANCTCGGTAC CAGCTTGATG 540
CATASCTTGA GTTWTCTATA NTGTCNC 567

(2) INFORMATION FOR SEQ ID NO:46:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 908 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:46:

GAGCGAAAGA CCGAGGGCAG NGNNTANGNG CGANGAAGCG GAGAGGGCCA AAAAGCAACC 60
GCTTTCCCG GGGGGTGCCG ATTCATTAAG GCAGGTGGAG GACAGGTTTC CCGATGGAAG 120
GCGGCAGGGG CGCAAGCAAT TAATGTGAGT AGGCCATTCA TTAGCACCCG GGCTTAACAT 180
TTAAGCTTCG GGTGGTATG TGGTGGGAAT TGTGAGCGGA TAACAATTC ACACAGGAAA 240
CAGCTATGAC CATGATTACG CCAAGCTATT TAGGTGACAT TATAGAATAA CTCAAGTTAT 300

GCATCAAGCT TGGTACCGAG TTCGGATCCA CTAGTAACGG CCGCCAGTGT GTGGAATTCG 360
GCTTAGTAGT TGCCGACCAT GGAGTGCTAC CTAGGCTAGA ATACCTGAGY TCCTCCCTAG 420
CCTCACTCAC ATTAAATTGT ATCTTTTCTA CATTAGATGT CCTCAGCGCC TTATTTCTGC 480
TGGACWATCG ATAAATTAAT CCTGATAGGA TGATAGCAGC AGATTATTA CTGAGAGTAT 540
GTTAATGTGT CATCCCTCCT AATAACGTA TTTGCATTTT AATGGAGCAA TTCTGGAGAT 600
AATCCCTGAA GGCAAAGGAA TGAATCTTGA GGGTGAGAAA GCCAGAATCA GTGTCCAGCT 660
GCAGTTGTGG GAGAAGGTGA TATTATGTAT GTCTCAGAAG TGACACCATA TGGGCAACTA 720
CTAAGCCCGA ATTCCAGCAC ACTGGCGGGC GTTACTAATG GATCCGAGCT CGGTACCAAG 780
CTTGATGCAT AGCTTGAGTA TCTATAGTGT CACTAAATAG CCTGGCGTTA TCATGGTCAT 840
AGCTGTTTCC TGTGTGAAAT TGTATCCGC TCCCAATTCC CCCCACCATA CGAGCCGGAA 900
CATAAAGT 908

(2) INFORMATION FOR SEQ ID NO:47:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 480 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:47:

TGCCAACAAG GAAAGTTTAA AATTTCCCTT TGAGGATTCT TGGTGATCAT CAAATTCAGT 60
GGTTTTTAAG GTTGTCTTCT GTCAAATAAC TCTAACTTTA AGCCAAACAG TATATGGAAG 120

CACAGATAKA ATATTACACA GATAAAAGAG GAGTTGATCT AAAGTARAGA TAGTTGGGGG 180
CTTTAATTTC TGGAACTAG GTCTCCCAT CTTCTTCTGT GCTGAGGAAC TTCTTGAAG 240
CGGGGATTCT AAAGTTCTTT GGAAGACAGT TTGAAAACCA CCATGTTGTT CTCAGTACCT 300
TTATTTTAA AAAGTAGGTG AACATTTTGA GAGAGAAAAG GGCTTGGTTG AGATGAAGTC 360
CCCCCCCCC CTTTTTTTTT TTITAGCTGA AATAGATACC CTATGTINAA RGAARGGATT 420
ATTATTTACC ATGCCAYTAR SCATATGCTC TTTGATGGGC NYCTCCSTAC CCTCCTTAAG 480

(2) INFORMATION FOR SEQ ID NO:48:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 591 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(x) SEQUENCE DESCRIPTION: SEQ ID NO:48:

AAGAGGGTAC CGAGTGAAT TTCCGCTTCA CTAGTCTGGT GTGGCTAGTC GGTTCGTGG 60
TGGCCAACAT TACGAATTC CAACTCAACC GTTCTTGGAC GTTCAAGCGG GAGTACCGGC 120
GAGGATGGTG GCGTGAATTC TGGCCTTTCT TTGCCGTGGG ATCGGTAGCC GCCATCATCG 180
GTATGTTTAT CAAGATCTTC TTTACTAACC CGACCTCTCC GATTACCTG CCCGAGCCGT 240
GGTTTAACGA GGGGAGGGGG ATCCAGTCAC GCGAGTACTG GTCCAGATC TTCGCCATCG 300
TCGTGACAAT GCCTATCAAC TTCGTCGTCA ATAAGTTGTG GACCTTCCGA ACGGTGAAGC 360

ACTCCGAAAA CGTCCGGTGG CTGCTGTGCG GTGACTCCCA AAATCTTGAT AACACAAGG 420
TAACCGAATC GCGCTAAGGA ACCCCGGCAT CTCGGGTACT CTGCATATGC GTACCCCTTA 480
AGCCGAATTC CAGCACACTG GCGGCCGTTA CTAATTGGAT CCGAACTCCG TAACCAAGCC 540
TGATGCGTAA CTTGAGTTAT TCTATAGTGT CCCIAAAATA ACCTGGCGTT A 591

(2) INFORMATION FOR SEQ ID NO:49:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 454 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:49:

AAGAGGGTAC CTGCCTTGAA ATTTAAATGT CTAAGGAAAR TGGGAGATGA TTAAGAGTTG 60
GTGTGGCYTA GTCACACCAA AATGTATTIA TTACATCCTG CTCCTTTCTA GTTGACAGGA 120
AAGAAAGCTG CTGTGGGGAA AGGAGGGATA AATACTGAAG GGATTTACTA AACAAATGTC 180
CATCACAGAG TTTTCCTTTT TTTTITTTTG AGACAGAGTC TTGCTCTGTC ACCCAGGCTG 240
GAATGAAGWG GTATGATCTC AGTTGAATGC AACCTCTACC TCCTAGGTTC AAGCGATTCT 300
CATGCCTCAG CCTCCTGAGC AGCTGGGACT ATAGGCGCAT GCTACCATGC CAGGCTAATI 360
TTTATATTTT TATTAGAGAC GGGGTGTTGC CATGTTGGCC AGGCAGGTCT CGAACTCCTG 420
GGCCTCAGAT GATCTGCCCC ACCGTACCCT CTIA 454

(2) INFORMATION FOR SEQ ID NO:50:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 463 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:50:

AAGAGGGTAC CAAAAAAG AAAAAGGAAA AAAAGAAAA CAACTTGTA	60
GCTGCATACA GCTTTTTTTT TTAAATAAA TGGTGCCAAC AAATGTTTT GCATTCACAC	120
CAATTGCTGG TTTTGAAATC GTACTCTCA AAGGTATTG TGCAGATCA TCCAATAGTG	180
ATGCCCCGTA GGTTTTGTGG ACTGCCACG TTGTCTACCT TCTCATGTAG GAGCCATTGA	240
GAGACTGTTT GGACATGCCT GTGTTTCATGT AGCCGTGATG TCCGGGGGCC GTGTACATCA	300
TGTTACCGTG GGGTGGGGTC TGCATTGGCT GCTGGGCATA TGGCTGGGTG CCCATCATGC	360
CCATCTGCAT CTGCATAGGG TATTGGGGCG TTGATCCAT ATAGCCATGA TTGCTGTGGT	420
AGCCACTGTT CATCATTGGC TGGGACATGC TGTACCCTC TTA	463

(2) INFORMATION FOR SEQ ID NO:51:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 399 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:51:

CTTCAACCTC CCAAAGTGCT GGGATTACAG GACTGAGCCA CCACGCTCAG CCTAAGCCTC	60
TTTTTCACTA CCCTCTAAGC GATCTACCAC AGTGATGAGG GGCTAAAGAG CAGTGCAATT	120
TGATTACAAT AATGGAACCT AGATTATATTA ATTAACAATT TTTCCTTAGC ATGTTGGTTC	180
CATAATTATT AAGAGTATGG ACTTACTTAG AAATGAGCTT TCATTTTAAG AATTTTCATCT	240
TTGACCTTCT CTATTAGTCT GAGCAGTATG ACACTATACG TATTTTATTT AACTAACCTA	300
CCTTGAGCTA TTACTTTTTA AAAGGCTATA TACATGAATG TGTATTGTCA ACTGTAAAGC	360
CCCACAGTAT TTAATTATAT CATGATGTCT TTGAGGTTG	399

(2) INFORMATION FOR SEQ ID NO:52:

(1) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 392 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:52:

CTTCAACCTC AATCAACCTT GGTAATTGAT AAAATCATCA CTAACTTTC TGATATAATG	60
GCAATAATTA TCTGAGAAAA AAAGTGGTG AAAGATTAAA CTGCAATTC TCTCAGAATC	120
TTGAAGGATA TTTGAATAAT TCAAAAGCGG AATCAGTAGT ATCAGCCGAA GAAACTCACT	180
TAGCTAGAAC GTTGGACCCA TGGATCTAAG TCCCTGCCCT TCCACTAACC AGCTGATTGG	240
TTTTGTGIAA ACCTCCTACA CGCTTGGGCT TGGTCGCCCT ATTTGTCANA GTAAAGGCTG	300

AAATAGGAAG ATAATGAACC GTGTCTTTTT GGTCTCTTTT CCATCCATTA CTCTGATTTT 360

ACAAAGAGGC CTGTATTCCC CTGGTGAGGT TG 392

(2) INFORMATION FOR SEQ ID NO:53:

(1) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 179 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:53:

TTCGGGTGAT GCCTCCTCAG GCTACAGTGA AGACTGGATT ACAGAAAGGT GCCAGCGAGA 60

TTTCAGATTC CTGTAAACCT CTAAGAAAAA GGAGTCGCGC CTCAACTGAT GTAGAAATGA 120

CTAGTTCAGC ATACNGAGAC ACNTCTGACT CCGATTCTAG AGGACTGAGT GACCTGCAN 179

(2) INFORMATION FOR SEQ ID NO:54:

(1) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 112 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:54:

TTCGGGTGAT GCCTCCTCAG GCTACATCAT NATAGAAGCA AAGTAGAANA ATCNNGTTTG 60

TGCATTTTCC CACANACAAA ATTCAAATGA NTGGAAGAAA TTGGGANAGT AT 112

(2) INFORMATION FOR SEQ ID NO:55:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 225 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:55:

```
TGAGCTTCGG CTTCTGACAA CTCAATAGAT AATCAAAGGA CAACTTTAAC AGGGATTCAC      60
AAAGGAGTAT ATCCAAATGC CAATAAACAT ATAAAAAGGA ATTCAGCTTC ATCATCATCA      120
GAAGWATGCA AATTAAAACC ATAATGAGAA ACCACTATGT CCCACTAGAA TAGATAAAAT      180
CTTAAAGAC TGGTAAAACC AAGTGTGGT AAGGCAAGAG GAGCA                          225
```

(2) INFORMATION FOR SEQ ID NO:56:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 175 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:56:

```
GCTCCTCTTG CTTACCAAC ACATTCTCAA AAACCTGTTA GAGTCCTAAG CATTCTCCTG      60
TTAGTATTGG GATTTTACCC CTGTCCTATA AAGATGTTAT GTACCAAAAA TGAAGTGGAG      120
GGCCATACCC TGAGGGAGGG GAGGGATCTC TAGTGTGTGC AGAAGCGGAA GCTCA          175
```


(2) INFORMATION FOR SEQ ID NO:57:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 223 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:57:

```
AGCCATTTAC CACCCATGGA TGAATGGATT TTGTAATTCT AGCTGTTGTA TTTGTGAAT      60
TTGTTAATTT TGTGTTTTT CTGTGAAACA CATACATTGG ATATGGGAGG TAAAGGAGTG     120
TCCCAGTTGC TCCTGGTCAC TCCCTTTATA GCCATTACTG TCTTGTTTCT TGTAACACAG     180
GTTAGGTTTT GGTCTCTCTT GCTCCACTGC AAAAAAAAAA AAA                        223
```

(2) INFORMATION FOR SEQ ID NO:58:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 211 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:58:

```
GTTCGAAGCT GAACGTGTAG GTAGCGGATC TCACAACTGG GGAAGTGTCA AAGACGAATT      60
AACTGACTTG GATCAATCAA ATGTGACTGA GGAAACACCT GAAGGTGAAG AACATCATCC     120
AGTGGCAGAC ACTGAAAATA AGGAGAATGA AGTTGAAGAG GTAAAAGAGG AGGGTCCAAA     180
```

AGAGATGACT TTGGATGGGT GGTAATGGC T

211

(2) INFORMATION FOR SEQ ID NO:59:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 208 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:59:

GCTCCTCTTG CCTTACCAAC TTTGCACCCA TCATCAACCA TGTGGCCAGG TTTGCAGCCC 60

AGGCTGCACA TCAGGGGACT GCCTCGCAAT ACTTCATGCT GTTGCTGCTG ACTGATGGTG 120

CTGTGACGGA TGTGGAAGCC ACACGTGAGG CTGTGGTGCG TGCCTCGAAC CTGCCCCATGT 180

CAGTGATCAT TATGGGTGGT AAATGGCT 208

(2) INFORMATION FOR SEQ ID NO:60:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 171 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:60:

AGCCATTTAC CACCCATACT AAATTCTAGT TCAAACCTCCA ACTTCTTCCA TAAAACATCT 60

AACCACTGAC ACCAGTTGGC AATAGCTTCT TCCTTCTTTA ACCTCTTAGA GTATTTATGG 120

TCAATGCCAC ACATTTCTGC AACTGAATAA AGTTGGTAAG GCAAGAGGAG C 171

(2) INFORMATION FOR SEQ ID NO:61:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 134 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:61:

CGGGTGATGC CTCCTCAGGC TTTGGTGTGT CCACTCNACT CACTGGCCTC TTCTCCAGCA 60

ACTGGTGAAN ATGTCCTCAN GAAAANCNCC ACACGCNGCT CAGGGTGGGG TGGGAANCA 120

CANAATCATC NGGC 134

(2) INFORMATION FOR SEQ ID NO:62:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 145 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:62:

AGAGGGTACA TATGCAACAG TATATAAAGG AAGAAGTGCA CTGAGAGGAA CTTTCATCAAG 60

CCCATTTAAT CAATAAGTGA TAGAGTCAAG GCTCAACCCA GGTGTGACGG ATTCCAGGTC 120

CCAAGCTCCT TACTGGTACC CTCTT 145

(2) INFORMATION FOR SEQ ID NO:63:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 297 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:63:

```
TGCACTGAGA GGAATTCAAA GGGTTTATGC CAAAGAACAA ACCAGTCCTC TGCAGCCTAA    60
CTCATTTGTT TTTGGGCTGC GAAGCCATGT AGAGGGCGAT CAGGCAGTAG ATGGTCCCTC    120
CCACAGTCAG CGCCATGGTG GTCCGGTAAA GCATTTGGTC AGGCAGGCC1 CGTTTCAGGT    180
AGACGGGCAC ACATCAGCTT TCTGGAAAAA CTTTGTAGC TCTGGAGCTT TGTTCCTCCC    240
AGCATAATCA TACTGTGG AATCGGAGGT CAGTTTAGTT GGTAAGGCAA GAGGAGC        297
```

(2) INFORMATION FOR SEQ ID NO:64:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 300 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:64:

```
GCACTGAGAG GAACTTCCAA TACTATGTTG AATAGGAGTG GTGAGAGAGG GCATCCTTGT    60
CTTGTGCCGG TTTTCAAAGG GAATGCTTCC AGCTTTTGCC CATTCACTAT AATATTAAAG    120
```

AATGTTTAC CATTTTCTGT CTGCGCTGT TTTCTGTGT TTTGTTGGTC TCCTCATTCT 180
CCATTTT TAG GCCTTTACAT GTTAGGAATA TATTCTTTT AATGATACTT CACCTTTGGT 240
ATCTTTTGTG AGACTCTACT CATAGTGTGA TAAGCACTGG GTTGGTAAGG CAAGAGGAGC 300

(2) INFORMATION FOR SEQ ID NO:65:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 203 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:65:

GCTCCTCTTG CCTTACCAAC TCACCCAGTA TGTCAGCAAT TTTATCRGCT TTACCTACGA 60
AACAGCCTGT ATCCAAACAC TTAACACACT CACCTGAAAA GTTCAGGCAA CAATCGCCTT 120
CTCATGGGTC TCTCTGCTCC AGTTCTGAAC CTTTCTCTTT TCCTAGAACA TGCATTARG 180
TCGATAGAAG TTCCTCTCAG TGC 203

(2) INFORMATION FOR SEQ ID NO:66:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 344 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:66:

TACGGGGACC CCTGCATTGA GAAAGCGAGA CTCACTCTGA AGCTGAAATG CTGTTGCCCT 60
TGCAGTGCTG GTAGCAGGAG TTCTGTGCTT TGTGGGCTAA GGCTCCTGGA TGACCCCTGA 120
CATGGAGAAG GCAGAGTTGT GTGCCCTTC TCATGGCCTC GTCAAGGCAT CATGGACTGC 180
CACACACAAA ATGCCGTTTT TATTAACGAC ATGAAATTGA AGGAGAGAAC ACAATTCAC 240
GATGTGGCTC GTAACCATGG ATATGGTCAC ATACAGAGGT GTGATTATGT AAAGGTTAAT 300
TCCACCCACC TCATGTGGAA ACTAGCCTCA ATGCAGGGGT CCCA 344

(2) INFORMATION FOR SEQ ID NO:67:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 157 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:67:

GCACTGAGAG GAACTTCGTA GGGAGGTTGA ACTGGCTGCT GAGGAGGGG AACAAACAGG 60
TAACCAGACT GATAGCCATT GGATGGATAA TATGGTGGTT GAGGAGGGAC ACTACTTATA 120
GCAGAGGGTT GTGTATAGCC TGAGGAGCCA TCACCCG 157

(2) INFORMATION FOR SEQ ID NO:68:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 137 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:68:

GCACTGAGAG GAACTTCTAG AAAGTGAAAG TCTAGACATA AAATAAAATA AAAATTTAAA 60

ACTCAGGAGA GACAGCCCAG CACGGTGGCT CACGCCTGTA ATCCCAGAAC TTTGGGAGCC 120

TGAGGAGGCA TCACCCG 137

(2) INFORMATION FOR SEQ ID NO:69:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 137 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:69:

CGGGTGATGC CTCCTCAGGC TGTATTTTGA AGACTATCGA CTGGACTTCT TATCAACTGA 60

AGAAATCCGTT AAAAATACCA GTTGTATTAT TTCTACCTGT CAAAATCCAT TTCAAATGTT 120

GAAGTTCCTC TCAGTGC 137

(2) INFORMATION FOR SEQ ID NO:70:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 220 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:70:

AGCATGTTGA GCCCAGACAC GCAATCTGAA TGAGTGTGCA CCTCAAGTAA ATGTCTACAC	60
GCTGCCTGGT CTGACATGGC ACACCATCNC GTGGAGGGCA CASCTCTGCT CNGCCTACWA	120
CGAGGGCANT CTCATWGACA GGTTCACCC ACCAACTGC AAGAGGCTCA NNAAGTACTR	180
CCAGGGTMYA SGGACMASGG TGGGAYTYCA YCACWCATCT	220

(2) INFORMATION FOR SEQ ID NO:71:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 353 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:71:

CGTTAGGGTC TCTATCCACT GCTAAACCAT ACACCTGGGT AAACAGGGAC CATTTAACAT	60
TCCCANCTAA ATATGCCAAG TGACTIONACA TGTTTATCTT AAAGATGTCC AAAACGCAAC	120
TGATTTTCTC CCCTAAACCT GTGATGGTGG GATGATTAAN CCTGAGTGGT CTACAGCAAG	180
TTAAGTGCAA GGTGCTAAAT GAANGTGACC TGAGATACAG CATCTACAAG GCAGTACCTC	240
TCAACNCAGG GCAACTTTGC TTCTCANAGG GCATTAGCA GTGTCTGAAG TAATTTCTGT	300
ATTACAATC ACGGGGCGGG GGGTGAATAT CTANTGGANA GNAGACCCTA ACG	353

(2) INFORMATION FOR SEQ ID NO:72:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 343 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:72:

```
GCACTGAGAG GAACTTCCAA TACYATKATC AGAGTGAACA RGCARCCYAC AGAACAGGAG      60
AAAATGTTYG CAATCTCTCC ATCTGACAAA AGGCTAATAT CCAGAWTCTA AWAGGAACTT     120
AAACAAATTT ATGAGAAAAG AACARACAAC CTCAWCAAAA AGTGGGTGAA GGAWATGCTS     180
AAARGAAGAC ATYTATTCAG CCAGTAAACA YATGAAAAAA AGGCTCATSA TCACTGAWCA     240
TTAGAGAAAT GCAAAATCAAA ACCACAATGA GATACCATCT YAYRCCAGTT AGAAYGGTGA     300
TCATTAAAR STCAGGAAAC AACAGATGCT GGACAAGGTG TCA                          343
```

(2) INFORMATION FOR SEQ ID NO:73:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 321 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:73:

```
GCACTGAGAG GAACTTCAGA GAGAGAGAGA GAGTTCCACC CTGTACTTGG GGAGAGAAAC      60
AGAAGGTGAG AAAGTCTTTG GTTCTGAAGC AGCTTCTAAG ATCTTTTCAT TTGCTTCATT     120
```

TCAAAGTTCC CATGCTGCCA AAGTGCCATC CTTTGGGGTA CTGTTTTCTG AGCTCCAGTG 180
ATAACTCATT TATACAAGGG AGATACCCAG AAAAAAAGTG AGCAAATCTT AAAAAGGTGG 240
CTTGAGTTCA GCCTTAAATA CCATCTTGAA ATGACACAGA GAAAGAANGA TGTGGGTGG 300
GAGTGGATAG AGACCCTAAC G 321

(2) INFORMATION FOR SEQ ID NO:74:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 321 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:74:

GCACTGAGAG GAACTTCAGA GAGAGAGAGA GAGTTCACC CTGTACTTGG GGAGAGAAAC 60
AGAAGGTGAG AAAGTCTTIG GTTCTGAAGC AGCTTCTAAG ATCTTTTCAT TTGCTTCATT 120
TCAAAGTTCC CATGCTGCCA AAGTGCCATC CTTTGGGGTA CTGTTTTCTG AGCTCCAGTG 180
ATAACTCATT TATACAAGGG AGATACCCAG AAAAAAAGTG AGCAAATCTT AAAAAGGTGG 240
CTTGAGTTCA GYCTTAAATA CCATCTTGAA ATGAMACAGA GAAAGAAGGA TGTGGGTGG 300
GAGTGGATAG AGACCCTAAC G 321

(2) INFORMATION FOR SEQ ID NO:75:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 317 base pairs

- (B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:75:

GCACTGAGAG GAACTCCAC ATGCACTGAG AAATGCATGT TCACAAGGAC TGAAGTCTGG	60
AACTCAGTTT CTCAGTTCCA ATCCTGATTC AGGTGTTTAC CAGCTACACA ACCTTAAGCA	120
AGTCAGATAA CCTTAGCTTC CTCATATGCA AAATGAGAAT GAAAAGTACT CATCGCTGAA	180
TTGTTTTGAG GATTAGAAAA ACATCTGGCA TGCAGTAGAA ATTCAATTAG TATTCATTTT	240
CATTCTTCTA AATTAAACAA ATAGGATTTT TAGTGGTGGA ACTTCAGACA CCAGAAATGG	300
GAGTGGATAG AGACCCT	317

(2) INFORMATION FOR SEQ ID NO:76:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 244 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:76:

CGTAGGGTC TCTATCCACT CCCACTACTG ATCAAACCTCT ATTTATTTAA TTATTTTAT	60
CATACTTTAA GTTCTGGGAT ACACGTGCAG CATGCCGAGG TTTGTTGCAT AGGTATACAC	120
TTGCCATGGT GGTTTGCTGC ACCCATCAGT CCATCATCTA CATTAGGTAT TTCTCCTAAT	180

GCTATCCCTC CCCTAGCCCC TTACACCCCC AACAGGCTCT AGTGTGTGAA GTTCCTCTCA 240

GTGC 244

(2) INFORMATION FOR SEQ ID NO:77:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 254 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:77:

CGTTAGGGTC TCTATCCACT GAAATCTGAA GCACAGGAGG AAGAGAAGCA GTYCTAGTGA 60

GATGGCAAGT TCWTTTACCA CACTCTTTAA CATTYGTTC AGTTTAAACC TTTATTTATG 120

GATAATAAAG GTTAATATTA ATAATGATTT ATTTTAAGGC ATTCCCAAT TTGCATAATI 180

CTCCTTTTGG AGATACCCTT TTATCTCCAG TGCAAGTCTG GATCAAAGTG ATASAMAGAA 240

GTTCCTCTCA GTGC 254

(2) INFORMATION FOR SEQ ID NO:78:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 355 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:78:

TTCGATACAG GCAAACATGA ACTGCAGGAG GGTGGTGACG ATCATGATGT TGCCGATGGT 60
CCGGATGGNC ACGAAGACGC ACTGGANCAC GTGCTTACGT CCTTTTGCTC TGTGATGGC 120
CCTGAGGGGA CGCAGGACCC TTATGACCCT CAGAATCTTC ACAACGGGAG ATGGCACTGC 180
ATTGANTCCC ANTGACACCA GAGACACCCC AACCACCAGN ATATCANTAT ATTGATGTAG 240
TTCCTGTAGA NGGCCCCCTT GTGGAGGAAA GCTCCATNAG TTGGTCATCT TCAACAGGA1 300
CTCAACAGTT TCCGATGGCT GTGATGGGCA TAGTCATANT TAACNTGTN TCGAA 355

(?) INFORMATION FOR SEQ ID NO:79:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 406 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:79:

TAAGAGGGTA CCAGCAGAAA GGTTAGTATC ATCAGATAGC ATCTTATACG AGTAATATGC 60
CTGCTATTTG AAGTGTAATT GAGAAGGAAA ATTTTAGCGT GCTCACTGAC CTGCCTGTAG 120
CCCCAGTGAC AGCTAGGATG TGCATTCTCC AGCCATCAAG AGACTGAGTC AAGTTGTTCC 180
TTAAGTCAGA ACAGCAGACT CAGCTCTGAC ATTCTGATTC GAATGACACT GTTCAGGAAT 240
CGGAATCCTG TCGATTAGAC TGGACAGCTT GTGGCAAGTG AATTTGCCTG TAACAAGCCA 300
GATTTTTTAA AATTTATATT GTAAATAATG TGTGTGTGTG TGTGTGTATA TATATATATA 360
TGTACAGTTA TCTAAGTTAA TTTAAAGTT GTTTGGTACC CTCTTA 406

(2) INFORMATION FOR SEQ ID NO:80:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 327 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:80:

```
TTTTTTTTTT TTTACTCGGC TCAGTCTAAT CCTTTTGTG GTCAC TCATA GGCCAGACTT    60
AGGGCTAGGA TGATGATTAA TAAGAGGGAT GACATAACTA TTAGTGGCAG GTTAGTTGTT    120
TG TAGGGCTC ATGGTAGGGG TAAAAGGAGG GCAATTCTA GATCAAATAA TAAGAAGGTA    180
ATAGCTACTA AGAAGAATTT TATGGAGAAA GGGACGCGGG CGGGGGATAT AGGGTCGAAG    240
CCGCACTCGT AAGGGGTGGA TTTTCTATG TAGCCGTTGA GTTGTGGTAG TCAAAATGTA    300
ATAATTATTA GTAGTAAGCC TAGGAGA                                         327
```

(2) INFORMATION FOR SEQ ID NO:81:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 318 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:81:

```
TAGTCTATGC GGTGATTTCG GCAATCCATT ATTTGCTGGA TTTTGT CATG TGTTTTGCCA    60
```

ATTGCATTCA TAATTTATTA TGCATTTATG CTTGTATCTC CTAAGTCATG GSTATATAATC 120
CATGCTTTTT ATGTTTTGTC TGACATAAAC TCTTATCAGA GCCCTTTGCA CACAGGGATT 180
CAATAAATAT TAACACAGTC TACATTTATT TGGTGAATAT TGCATATCTG CTGTACTGAA 240
AGCACATTAA GTAACAAAGG CAAGTGAGAA GAATGAAAAG CACTACTCAC AACAGTTATC 300
ATGATTCCGC ATAGACTA 318

(2) INFORMATION FOR SEQ ID NO:82:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 338 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:82:

TCTTCAACCT CTACTCCAC TAATAGCTTT TTGATGACTT CTAGCAAGCC TCGCTAACCT 60
CGCCTTACCC CCCACTATTA ACCTACTGGG AGAACTCTCT GTGCTAGTAA CCACGTTCTC 120
CTGATCAAT ATCACTCTCC TACTTACAGG ACTCAACATA CTAGTCACAG CCCTATACTC 180
CCTCTACATA TTTACCACAA CACAATGGGG CTACTCACC CACCACATTA ACAACATAAA 240
ACCCTCATTC ACACGAGAAA ACACCTCAT GTTCATACAC CTATCCCCCA TTCTCCTCCT 300
ATCCCTCAAC CCCGACATCA TTACCGGGTT TTCCTCTT 338

(2) INFORMATION FOR SEQ ID NO:83:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 111 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:83:

AGCCATTTAC CACCCATCCA CAAAAAAAAA AAAAAAAAAAG AAAAATATCA AGGAATAAAA 60
ATAGACTTIG AACAAAAAGG AACATTTGCT GGCCTGAGGA GGCATCACCC G 111

(2) INFORMATION FOR SEQ ID NO:84:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 224 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:84:

TCGGGTGATG CCTCCTCAGG CCAAGAAGAT AAAGCTTCAG ACCCCTAACA CATTTCAAA 60
AAGGAAGAAA GGAGAAAAA GGGCATCATC CCCGTTCCGA AGGTCAGGG AGGAGGAAAT 120
TGAGGTGGAT TCACGAGTTG CGGACAATC CTTTGATGCC AAGCGAGGTG CAGCCGGAGA 180
CTGGGGAGAG CGAGCCAATC AGGTTTGTAA GTTCCTCTCA GTGC 224

(2) INFORMATION FOR SEQ ID NO:85:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 348 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:85:

GCACTGAGAG GAACTTCGTT GGAAACGGGT TTTTTCATG TAAGGCTAGA CAGAAGAATT	60
CTCAGTAACT TCCTTGTGTT GTGTGTATTC AACTCACASA GTTGAACGAT CCTTTACACA	120
GAGCAGACTT GTAACACTCT TWTGTGGAA TTTGCAAGTG GAGATTTAG SCGCTTTGAA	180
GTSAAAGGTA GAAAAGGAAA TATCTTCTA TAAAACTAG ACAGAATGAT TCTCAGAAAC	240
TCCTTTGTGA TGTGTGCGTT CAACTCACAG AGTTTAACCT TTCWTTTCAT AGAAGCAGTT	300
AGGAAACACT CTGTTTGTA AGTCTGCAAG TGGATAGAGA CCCTAACG	348

(2) INFORMATION FOR SEQ ID NO:86:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 293 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:86:

GCACTGAGAG GAACTTCYTT GTGWTGKTG YATTCAACTC ACAGAGTTGA ASSWTSMTT	60
ACABAGWKCA GGCTTKCAA CACTCTTTT GTMGAATYG CAAGWGGAKA TTTSRRCCRC	120
TTTGWGGYCW WYSKTMGA AW MGRWATATC TTCWYATMRA AMCTAGACAG AAKSATTCTC	180

AKAAWSTYYY YTGTAAGWS TGCRTTCAAC TCACAGAGKT KAACMWTYCT KYTSATRGAG 240

CAGTTWKGA ACTCTMTTTC TTTGGATTCT GCAAGTGGAT AGAGACCCTA ACG 293

(2) INFORMATION FOR SEQ ID NO:87:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:87:

CTCCTAGGCT 10

(2) INFORMATION FOR SEQ ID NO:88:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:88:

AGTAGTTGCC 10

(2) INFORMATION FOR SEQ ID NO:89:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 11 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:89:

TTCCGTTATG C

11

(2) INFORMATION FOR SEQ ID NO:90:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:90:

TGGTAAAGGG

10

(2) INFORMATION FOR SEQ ID NO:91:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:91:

TCGGTCATAG

10

(2) INFORMATION FOR SEQ ID NO:92:

(i) SEQUENCE CHARACTERISTICS:

100

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:92:

TACAACGAGG

10

(2) INFORMATION FOR SEQ ID NO:93:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:93:

TGGATTGGTC

10

(2) INFORMATION FOR SEQ ID NO:94:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:94:

CTTCTACCC

10

(2) INFORMATION FOR SEQ ID NO:95:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:95:

TTTGGCTCC

10

(2) INFORMATION FOR SEQ ID NO:96:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:96:

GGAACCAATC

10

(2) INFORMATION FOR SEQ ID NO:97:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:97:

TCGATACAGG

10

(2) INFORMATION FOR SEQ ID NO:98:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:98:

GGTACTAAGG

10

(2) INFORMATION FOR SEQ ID NO:99:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:99:

AGTCTATGCG

10

(2) INFORMATION FOR SEQ ID NO:100:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:100:

CTATCCATGG

10

(2) INFORMATION FOR SEQ ID NO:101:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 10 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:101:

TCTGTCCACA

10

(2) INFORMATION FOR SEQ ID NO:102:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 10 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:102:

AAGAGGGTAC

10

(2) INFORMATION FOR SEQ ID NO:103:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 10 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:103:

CTTCAACCTC

10

(2) INFORMATION FOR SEQ ID NO:104:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 20 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:104:

GCTCCTCTTG CCTTACCAAC

20

(2) INFORMATION FOR SEQ ID NO:105:

- (i) SEQUENCE CHARACTERISTICS:
 - (A) LENGTH: 20 base pairs
 - (B) TYPE: nucleic acid
 - (C) STRANDEDNESS: single
 - (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:105:

GTAAGTCGAG CAGTGTGATG

20

(2) INFORMATION FOR SEQ ID NO:106:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:106:

GTAAGTCGAG CAGTCTGATG

20

(2) INFORMATION FOR SEQ ID NO:107:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:107:

GACTTAGTGG AAAGAATGTA

20

(2) INFORMATION FOR SEQ ID NO:108:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:108:

GTAATTCCGC CAACCGTAGT

20

(2) INFORMATION FOR SEQ ID NO:109:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:109:

ATGGTTGATC GATAGTGGAA

20

(2) INFORMATION FOR SEQ ID NO:110:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:110:

ACGGGGACCC CTGCATTGAG

20

(2) INFORMATION FOR SEQ ID NO:111:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:111:

TATTCTAGAC CATTGCTAC

20

(2) INFORMATION FOR SEQ ID NO:112:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:112:

ACATAACCAC TTAGCGTTC

20

(2) INFORMATION FOR SEQ ID NO:113:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:113:

CGGGTGATGC CTCCTCAGGC

20

(2) INFORMATION FOR SEQ ID NO:114:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:114:

AGCATGTTGA GCCCAGACAC

20

(2) INFORMATION FOR SEQ ID NO:115:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:115:

GACACCTTGT CCAGCATCTG

20

(2) INFORMATION FOR SEQ ID NO:116:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:116:

TACGCTGCAA CACTGTGGAG

20

(2) INFORMATION FOR SEQ ID NO:117:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:117:

CGTTAGGGTC TCTATCCACT

20

(2) INFORMATION FOR SEQ ID NO:118:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:118:

AGACTGACTC ATGTCCCTA

20

(2) INFORMATION FOR SEQ ID NO:119:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:119:

TCATCGCTCG GTGACTCAAG

20

(2) INFORMATION FOR SEQ ID NO:120:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:120:

CAAGATTCCA TAGGCTGACC

20

(2) INFORMATION FOR SEQ ID NO:121:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:121:

ACGTACTGGT CTTGAAGGTC

20

(2) INFORMATION FOR SEQ ID NO:122:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:122:

GACGCTTGGC CACTTGACAC

20

(2) INFORMATION FOR SEQ ID NO:123:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:123:

GTATCGACGT AGTGGTCTCC

20

(2) INFORMATION FOR SEQ ID NO:124:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:124:

TAGTGACATT ACGACGCTGG

20

(2) INFORMATION FOR SEQ ID NO:125:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 20 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:125:

CGGGTGATGC CTCCTCAGGC

20

(2) INFORMATION FOR SEQ ID NO:126:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:126:

ATGGCTATTT TCGGGGGCTG ACA

23

(2) INFORMATION FOR SEQ ID NO:127:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 22 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:127:

CCGGTATCTC CTCGTGGGTA TT

22

(2) INFORMATION FOR SEQ ID NO:128:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 18 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:128:

CTGCCTGAGC CACAAATG

18

(2) INFORMATION FOR SEQ ID NO:129:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:129:

CCGGAGGAGG AAGCTAGAGG AATA

24

(2) INFORMATION FOR SEQ ID NO:130:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 14 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:130:

TTTTTTTTTT TTAG

14

(2) INFORMATION FOR SEQ ID NO:131:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 18 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:131:

Ser Ser Gly Gly Arg Thr Phe Asp Asp Phe His Arg Tyr Leu Leu Val
1 5 10 15

Gly Ile

(2) INFORMATION FOR SEQ ID NO:132:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 22 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:132:

Gln Gly Ala Ala Gln Lys Pro Ile Asn Leu Ser Lys Xaa Ile Glu Val
1 5 10 15

Val Gln Gly His Asp Glu
20

(2) INFORMATION FOR SEQ ID NO:133:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 23 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:133:

Ser Pro Gly Val Phe Leu Glu His Leu Gln Glu Ala Tyr Arg Ile Tyr
1 5 10 15

Thr Pro Phe Asp Leu Ser Ala
20

(2) INFORMATION FOR SEQ ID NO:134:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:134:

Tyr Leu Leu Val Gly Ile Gln Gly Ala
1 5

(2) INFORMATION FOR SEQ ID NO:135:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:135:

Gly Ala Ala Gln Lys Pro Ile Asn Leu

1 5

(2) INFORMATION FOR SEQ ID NO:136:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 9 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:136:

Asn Leu Ser Lys Xaa Ile Glu Val Val

1 5

(2) INFORMATION FOR SEQ ID NO:137:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 9 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:137:

Glu Val Val Gln Gly His Asp Glu Ser

1 5

(2) INFORMATION FOR SEQ ID NO:138:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:138:

His Leu Gln Glu Ala Tyr Arg Ile Tyr
1 5

(2) INFORMATION FOR SEQ ID NO:139:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:139:

Asn Leu Ala Phe Val Ala Gln Ala Ala
1 5

(2) INFORMATION FOR SEQ ID NO:140:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:140:

Phe Val Ala Gln Ala Ala Pro Asp Ser
1 5

(2) INFORMATION FOR SEQ ID NO:141:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9388 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:141:

```
GCTCGCGGCC GCGAGCTCAA TTAACCCTCA CTAAGGGAG TCGACTCGAT CAGACTGTTA    60
CTGTGTCTAT GTAGAAAGAA GTAGACATAA GAGATTCCAT TTTGTTCTGT ACTAAGAAAA    120
ATTCTTCTGC CTTGAGATGC TGTAACTCG TAACCCTAGC CCCAACCTG TGCTCACAGA    180
GACATGTGCT GTGTTGACTC AAGGTTCAAT GGATTAGGG CTATGCTTTG TTAAGAAAGT    240
GCTTGAAGAT AATATGCTTG TTAAGAGTCA TCACCATCT CTAATCTCAA GTACCCAGGG    300
ACACAATACA CTGCGGAAGG CCGCAGGGAC CTCTGTCTAG GAAAGCCAGG TATTGTCCAA    360
GATTTCTCCC CATGTGATAG CCTGAGATAT GGCCTCATGG GAAGGGTAAG ACCTGACTGT    420
CCCCCAGCCC GACATCCCCC AGCCCGACAT CCCCAGCCC GACACCCGAA AAGGGTCTGT    480
GCTGAGGAGG ATTAGTAAAA GAGGAAGGCC TCTTGCAGT TGAGGTAAGA GGAAGGCATC    540
TGTCTCCTGC TCGTCCCTGG GCAATAGAAT GTCTTGGTGT AAAACCCGAT TGTATGTTCT    600
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ACTTACTGAG ATAGGAGAAA ACATCCTTAG GGCTGGAGGT GAGACACGCT GCGGGAATA 660

CTGCTCTTTA ATGCACCGAG ATGTTTGTAT AAGTGCACAT CAAGGCACAG CACCTTTCCT 720

TAAACTTATT TATGACACAG AGACCTTGT TCACGTTTTC CTGCTGACCC TCTCCCCACT 780

ATTACCCTAT TGGCCTGCCA CATCCCCCTC TCCGAGATGG TAGAGATAAT GATCAATAAA 840

TACTGAGGGA ACTCAGAGAC CAGTGTCCCT GTAGGTCCTC CGTGTGCTGA GCGCCGGTCC 900

CTTGGGCTCA CTTTCTTTC TCTATACTTT GTCTCTGTGT CTCTTCTTT TCTCAGTCTC 960

TCGTTCCACC TGACGAGAAA TACCCACAGG TGTGGAGGGG CAGGCCACCC CTCAATAAT 1020

TTACTAGCCT GTTCGCTGAC AACAAGACTG GTGGTGAGA AGGTGGGTC TTGGTGTCA 1080

CCGGGTGGCA GGCATGGGCC AGGTGGGAGG GTCTCCAGCG CCTGGTGCAA ATCTCCAAGA 1140

AAGTGCAGGA AACAGCACCA AGGGTGATTG TAAATTTGA TTTGGCGCGG CAGGTAGCCA 1200

TTCCAGCGCA AAAATGCGCA GGAAAGCTTT TGCTGTGCTT GTAGGCAGGT AGGCCCCAAG 1260

CACCTCTTAT TGGCTAATGT GGAGGGAACC TGCACATCCA TTGGCTGAAA TCICCGTCTA 1320

TTTGAGGCTG ACTGAGCGCG TTCCTTCTT CTGTGTTGCC TGGAAACGGA CTGTCTGCCT 1380

AGTAACATCT GATCACGTTT CCCATTGGCC GCCGTTTCCG GAAGCCCGCC CTCCATTTC 1440

CGGAAGCCTG GCGCAAGGTT GGTCTGCAGG TGGCTCCAG GTGCAAAGTG GGAAGTGTGA 1500

GTCTCAGTC TTGGGCTATT CGGCCACGTG CCTGCCGAC ATGGGACGCT GGAGGGTCAG 1560

CAGCGTGGAG TCCTGGCCTT TTGCGTCCAC GGGTGGGAAA TTGGCCATTG CCACGGCGGG 1620

AACTGGGACT CAGGCTGCCC CCCGGCCGTT TCTCATCCGT CCACGGGACT CGTGGGCGCT 1680

CGCACTGGCG CTGATGTAGT TTCCTGACCT CTGACCCGTA TTGCTCCAG ATTAAGGTA 1740

AAAACGGGGC TTTTTCAGCC CACTCGGGTA AAACGCCTT TGATTTCTAG GCAGGTGTTT 1800

TGTTGCACGC CTGGGAGGGA GTGACCCGCA GGTGAGGTT TATTAATAA CATTCTGGT 1860

TTATGTTATG TTTATAATA AGCACCCAA CCTTTACAA ATCTACCTT TTGCCAGTG 1920

TATTATTTAG TGGACTGCT CTGATAAGGA CAGCCAGTA AAATGGAATT TTGTGTTGC 1980

TAATIAAACC AATTTTGTG TTTGGTGTG GTCCTAATAG CAACAATTC TCAGGCTTTA 2040

TAAACCAIA TTTCTGGGG GAAATTTCTG TGTAAGGCAC AGCGAGTTAG TTTGGAATTG 2100

TTTTAAAGGA AGTAAGTCC TGGTTTGAT ATCTTAGTAG TGTAATGCC AACCTGGTT 2160

TTACTAACC TGTTTTAGA CTCTCCCTT CCTTAAATCA CCTAGCCTG TTTCCACCTG 2220

AATTGACTCT CCCTTAGCTA AGAGCGCCAG ATGGACTCCA TCTTGGCTCT TTTACTGGCA 2280

GCCCCTTCT CAAGGACTTA ACTTGTGCA GCTGACTCCC AGCACATCCA AGAATGCAAT 2340

TAAGTGTAA GATACTGTG CAAGCTATAT CCGCAGTCC GAGGAATTCA TCCGATTGAT 2400

TATGCCCCAA AGCCCCGCGT CTATCACCT GTAATAATCT TAAAGCCCT GCACCTGGAA 2460

CTATTAAGT TCCTGTAACC ATTTATCCT TTAAGTTTT TGCTTACTT ATTCTGTAA 2520

AATTGTTTTA ACTAGACCTC CCCTCCCTT TCTAAACCA AGTATAAAG AAGATCTAGC 2580

CCCTTCTCA GAGCGGAGAG AATTTTGAGC ATTAGCCATC TCTTGGCGG CAGCTAAATA 2640

AATGGACTTT TAATTTGTCT CAAAGTGTG CGTTTTCTCT AACTCGCTCA GGTACGACAT 2700

TTGGAGGCCC CAGCGAGAAA CGTACCGGG AGAAACGTCA CCGGGCGAGA GCCGGGCCC 2760

CTGTGTGCTC CCCCAGGAGG ACAGCCAGCT TGTAGGGGGG AGTGCCACCT GAAAAAAAAA 2820

TTTCCAGGTC CCCAAAGGGT GACCGTCTTC CGGAGGACAG CGGATCGACT ACCATGCGGG 2880

TGCCCCACAA AATTCCACCT CTGAGTCCTC AACTGCTGAC CCCGGGGTCA GGTAGGTCAG 2940

ATTTGACTTT GGTTC TGGA GAGGGAAGCG ACCCTGATGA GGGTGTCCCT CTTTGTACTC 3000

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AGGATGCTGG GGGACTGAGT CCTGGTTTCT GGCAGACTGG TCTCTCTCTC TCTCTTTTTC 3180

TATCTCTAAT CTTTCCTTGT TCAGGTTTCT TGGAGAATCT CTGGGAAAGA AAAAAGAAAA 3240

ACTGTTATAA ACTCTGTGTG AATGGTGAAT GAATGGGGGA GGACAAGGGC TTGCGCTTGT 3300

CCTCCAGTTT GTAGCTCCAC GGCAGAAAGCT ACGGAGTTCA AGTGGGCCCT CACCTGCGGT 3360

TCCGTGGCGA CCTCATAAGG CTTAAGGCAG CATCCGGCAT AGCTCGATCC GAGCCGGGGG 3420

TTTATACCGG CCTGTCAATG CTAAGAGGAG CCCAAGTCCC CTAAGGGGGA GCGGCCAGGC 3480

GGGCATCTGA CTGATCCCAT CACGGGACCC CCTCCCCTTG TTTGTCTAAA AAAAAAAAAA 3540

GAAGAACTG TCATAACTGT TTACATGCCC TAGGGTCAAC TGTTTGTTTT ATGTTTATTG 3600

TTCTGTTGCG TGTCTATTGT CTTGTTTAGT GGTGTGCAAG GTTTTGCATG TCAGGACGTC 3660

GATATTGCCC AAGACGTCTG GGTAAGAACT TCTGCAAGGT CCTTAGTGCT GATTTTTTGT 3720

CACAGGAGGT TAAATTTCTC ATCAATCATT TAGGCTGGCC ACCACAGTCC TGTCTTTTCT 3780

GCCAGAAGCA AGTCAGGTGT TGTTACGGGA ATGAGTGTA AAAAAATTC GCCTGATTGG 3840

GATTTCTGGC ACCATGATGG TTGTATTTAG ATTGTCATAC CCCACATCCA GGTGATTGG 3900

ACCTCCTCTA AACTAACTG GTGGTGGGT CAAACAGCC ACCCTGCAGA TTCCTTGCT 3960

CACCTCTTIG GTCATTCTGT AACTTTTCT GTGCCCTTAA ATAGCACACT GTGTAGGGAA 4020

ACCTACCCTC GTACTGCTTT ACTTCGTTA GATTCTTACT CTGTTCTCT GTGGCTACTC 4080

ICCATCTTA AAAACGATCC AAGTGGTCT TTTCTCCTC CTGCCCCCT ACCCCACACA 4140

TCTCGTTTT CAGTGCACA GCAAGTTCAG CGTCTCCAGG ACTTGGCTCT GCTCTCACTC 4200

CTTGAACCT TAAAAGAAA AGCTGGGTT GAGCTATTTG CCTTTGAGTC ATGGAGACAC 4260

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CAAAGTTTG AGTTGAGTGG CCCCTGAAG GGCACTGAA CCTCACAATT GTTCAAGCTG 4740

TGTGGCGGT TGTACTGAA ACTCCGGCC TCCCTGATCA GTTCCCTAC ATTGATCAAT 4800

GGCTGAGTTT GGTGAGGAG ACCCCTTCCA TGGCTCCACT CATGCACCAT TCATAATTTT 4860

ACCTCCAAG TCCTCTGAG CCAGACCGTG TTTTCGCTC GACCCTCAGC CGGTCAGCT 4920

CGCCCTGTAC TGCCTCTCTC TGAAGAAGAG GAGAGTCTCC CTCACCCAGT CCCACCGCCT 4980

TAAAACCAGC CTAATCCCTT AGGGTCATCC CATGTCTCCT CGGCTATGTC CCCTGTAGGC 5040

TCATCACCCA TTGCCTCTTG GTTGCAACCG TGGTGGGAGG AAGTAGCCCC TCTACTACCA 5100

CTGAGAGAGG CACAAGTCCC TCTGGGTGAT GAGTGCTCCA CCCCCTTCCT GGTTCATGTC 5160

CCTTCTTTCT ACTTCTGACT TGTATAATTG GAAAACCCAT AATCCTCCCT TCTCTGAAAA 5220

GCCCCAGGCT TTGACCTCAC TGATGGAGTC TGTACTCTGG ACACATTGGC CCACCTGGGA 5280

TGACTGTCAA CAGCTCCTTT TGACCCTTTT CACCTCTGAA GAGAGGGAAA GTATCCAAAG 5340

AGAGGCCAAA AAGTACAACC TCACATCAAC CAATAGGCCG GAGGAGGAAG CTAGAGGAAT 5400

AGTGATTAGA GACCCAATTG GGACCTAATT GGGACCCAAA TTTCTCAAGT GGAGGGAGAA 5460

CTTTTGACGA TTTCCACCGG TATCTCCTCG TGGGTATTCA GGGAGCTGCT CAGAAACCTA 5520

TAAACTTGTC TAAGGCGACT GAAGTCGTCC AGGGGCATGA TGAGTCACCA GGAGTGTTTT 5580

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AGCCACTGAT AAAGCATCCT GGAGTATCAG AGTTTACTGT TAGATCAGCC TCATTGACT 5880

TCCCCTCCA CATGGTGTTC AAATCCAGCT AACTACTTC CTGACTCAA CTCCACTATT 5940

CCTGTTTATG ACTGTCAGGA ACTGTTGGAA ACTACTGAAA CTGGCCGACC TGATCTTCAA 6000

AATGTGCCCC TAGGAAAGGI GGATGCCACC GTGTTACAG ACAGTAGCAG CTCCTCGAG 6060

AAGGGACTAC GAAAGGCCGG TGCAGCTGTT ACCATGGAGA CAGATGTGTT GTGGGCTCAG 6120

GCTTTACCAG CAAACACCTC AGCACAAAAG GCTGAATTGA TCGCCCTCAC TCAGGCTCTC 6180

CGATGGGGTA AGGATATTAA CGTTAACT GACAGCAGGT ACGCCTTTGC TACTGTGCAT 6240

GTACGTGGAG CCATCTACCA GGAGCGTGGG CTACTACCT CAGCAGGTGG CTGTAATCCA 6300

CTGTAAAGGA CATCAAAGG AAMCAGGC TGTGCCCCG GTTAACCAGA AAGCTGATTC 6360

AGCAGCTCAA GATGCAGTGT GACTTTCAGT CACGCCTCTA AACTTGCTGC CCACAGTCTC 6420

CTTCCACAG CCAGATCTGC CTGACAATCC CGCATACTCA ACAGAAGAAG AAACTGGCC 6480

TCAGAACTCA GAGCCAATAA AAATCAGGAA GGTGGTGGA TTCTTCCTGA CTCTAGAATC 6540

TTCATACCCC GAACTCTTG GAAACTTTA ATCAGTCACC TACAGTCTAC CACCCATTTA 6600

GGAGGAGCAA AGCTACCTCA GTCCTCCGG AGCCGTTTTA AGATCCCCCA TCTCAAAGC 6660

CTAACAGATC AAGCAGCTCT CCGGTGCACA ACCTGCGCCC AGGTAAATGC CAAAAAGGT 6720

CCTAAACCCA GCCCAGGCCA CCGTCTCAA GAAACTCAC CAGGAGAAAA GTGGGAAAT 6780

GACTTTACAG AAGTAAACC ACACGGGCT GGTACAAAT ACCTTCTAGT ACTGGTAGAC 6840

ACCTTCTCTG GATGGACTGA AGCATTGCT ACCAAAAACG AACTGTCAA TATGGTAGTT 6900

AAGTTTTTAC TCAATGAAAT CATCCCTCGA CGTGGGCTGC CTGTTGCCAT AGGGTCTGAT 6960

AATGGACCGG CCTTCGCCTT GTCTATAGTT TAGTCAGTCA GTAAGGCGTT AACATTCAA 7020

TGGAAGCTCC ATTGTGCCTA TCGACCCAG AGCTCTGGG AAGTAGAACG CATGAACTGC 7080

ACCTAAAAA AACTCTTAC AAAATTAATC TTAGAAACCG GTGTAAATTG TGTAAAGTCTC 7140

CTTCCTTTAG CCTACTTAG AGTAAGGTGC ACCCCTTACT GGGCTGGGT CTTACCTTTT 7200

GAAATCATGT ATGGGAGGGC GCTGCCTATC TTGCCTAAGC TAAGAGATGC CCAATTGGCA 7260

AAAATATCAC AACTAATTT ATTACAGTAC CTACAGTCTC CCCAACAGGT ACAAGATATC 7320

ATCCTGCCAC TTGTTCGAGG AACCCATCCC AATCCAATTC CTGAACAGAC AGGGCCCTGC 7380

CATTCATTCC CGCCAGGTGA CCTGTTGTTT GTTAAAAAGT TCCAGAGAGA AGGACTCCCT 7440

CCTGCTTGGG AGAGACCTCA CACCGTCATC ACGATGCCAA CGGCTCTGAA GGTGGATGGC 7500

ATTCCTGCGT GGATTCATCA CTCCCGCATC AAAAAGGCCA ACGGAGCCCA ACTAGAAACA 7560

TGGGTCCCCA GGGCTGGGTC AGGCCCTTAA AACTGCACC TAAGTTGGGT GAAGCCATTA 7620

GATTAATICT TTTTCTTAAT TTTGTAAAC AATGCATAGC TTCTGTCAA CTTATGTATC 7680

TTAAGACTCA ATATAACCCC CTTGTTATAA CTGAGGAATC AATGATTGA TTCCCCAAAA 7740

ACACAAGTGG GGAATGTAGT GTCCAACCTG GTTTTTACTA ACCCTGTTTT TAGACTCTCC 7800

CTTTCCTTTA ATCACTCAGC CTTGTTTCCA CCTGAATTGA CTCTCCCTTA GCTAAGAGCG 7860

CCAGATGGAC TCCATCTTGG CTCTTTCCT GGCAGCCGCT TCCTCAAGGA CTTAACTTGT 7920

GCAAGCTGAC TCCCAGCACA TCCAAGAATG CAATTAATG ATAAGATACT GTGGCAAGCT 7980

ATATCCGCAG TCCCAGGAA TTCGTCCAAT TGATTACACC CAAAAGCCCC GCGTCTATCA 8040

CCTTGTAATA ATCTTAAAGC CCCTGCACCT GGAACATTA ACGTTCCTGT AACCATTAT 8100

CCTTTTAACT TTTTGCCTA CTTTATTCT GTAAAATTGT TTAACTAGA CCCCCCTCT 8160

CCTTTCTAAA CCAAAGTATA AAAGCAAATC TAGCCCCTTC TTCAGGCCGA GAGAATTTCC	8220
AGCGTTAGCC GTCTCTTGGC CACCAGCTAA ATAAACGGAT TCTTCATGTG TCTCAAAGTG	8280
TGGCGTTTTTCT TCTAACTCGC TCAGGTACGA CCGTGGTAGT ATTTTCCCCA ACGTCTTATT	8340
TTTAGGGCAC GTATGTAGAG TAACTTTTAT GAAAGAAACC AGTTAAGGAG GTTTTGGGAT	8400
TTCCTTTATC AACTGTAATA CTGGTTTTGA TTATTTATTT ATTTATTTAT TTTTTTTGAG	8460
AAGGAGTTTC ACTCTTGTTG CCCAGGCTGG AGTGCAATGG TGCGATCTTG GCTCACTGCA	8520
ACTTCCGCCT CCCAGGTTCA AGCGATTCTC CTGCCTCAGC CTCGAGAGTA GCTGGGATTA	8580
TAGGCATGCG CCACCACACC CAGCTAATTT TGTATTTTTA GTAAAGATGG GGTTCCTTCA	8640
TGTTGGTCAA GCTGGTCTGG AACTCCCCGC CTCGGGTGAT CTGCCCCCCT CGGCCTCCGA	8700
AAGTGCTGGG ATTACAGGTG TGATCCACCA CACCCAGCCG ATTTATATGT ATATAATCA	8760
CATTCTCTA ACCAAAATGT AGTGTTCCT TCCATCTTGA ATATAGGCTG TAGACCCCGT	8820
GGGTATGGGA CATTGTAAAC AGTGAGACCA CAGCAGTTTT TATGTCATCT GACAGCATCT	8880
CCAAATAGCC TTCATGGTTG TCACTGCTTC CCAAGACAAT TCCAAATAAC ACTTCCCAGT	8940
GATGACTTGC TACTTGCTAT TGTTACTTAA TGTGTTAAGG TGGCTGTTAC AGACACTAT	9000
AGTATGTCAG GAATTACACC AAAATTTAGT GGCTCAAACA ATCATTATAT TATGTATGTG	9060
GATTCTCATG GTCAGGTCAG GATTTCAGAC AGGGCACAAG GGTAGCCAC TTGTCTCTGT	9120
CTATGATGTC TGGCCTCAGC ACAGGAGACT CAACAGCTGG GGTCTGGGAC CATTTGGAGG	9180
CTTGTTCCCT CACATCTGAT ACCTGGCTTG GGATGTTGGA AGAGGGGGTG AGCTGAGACT	9240

GAGTGCCTAT ATGTAGTGTT TCCATATGGC CTTGACTTCC TTACAGCCTG GCAGCCTCAG 9300
GGTAGTCAGA ATTCTTAGGA GGCACAGGGC TCCAGGGCAG ATGCTGAGGG GTCTTTTATG 9360
AGGTAGCACA GCAAATCCAC CCAGGATC 9388

(2) INFORMATION FOR SEQ ID NO:142:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 419 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:142:

TGTAAGTCGA GCAGTGTGAT GGAAGGAATG GTCTTTGGAG AGAGCATATC CATCTCCTCC 60
TCACTGCCTC CTAATGTCAT GAGGTACACT GAGCAGAATT AACAGGGTA GTCTTAACCA 120
CACTATTTTT AGCTACCTTG TCAAGCTAAT GGTAAAGAA CACTTTTGGT TTACACTTGT 180
TGGGTCATAG AAGTTGCTTT CCGCCATCAC GCAATAAGTT TGTGTGTAAT CAGAAGGAGT 240
TACCTTATGG TTTCAGTGTC ATTCTTTAGT TAACTTGGGA GCTGTGTAAT TTAGGCTTTG 300
CGTATTATTT CACTTCTGTT CTCCACTTAT GAAGTGATTG TGTGTTGCGG TGTGTGTGCG 360
TGCGCATGTG CTTCGGCAG TTAACATAAG CAAATACCCA ACATCACACT GCTCGACTT 419

(2) INFORMATION FOR SEQ ID NO:143:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 402 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:143:

TGTAAGTCGA GCAGTGTGAT GTCCACTGCA GTGTGTTGCT GGGAACAGTT AATGAGCAAA	60
TTGTATACAA TGGCTAGTAC ATTGACCGGG ATTTGTTGAA GCTGGTGAGT GTTATGACTT	120
AGCCTGTTAG ACTAGTCTAT GCACATGGCT CTGGTCAACT ACCGCTCTCT CATTTCTCCA	180
GATAAATCCC CCATGCTTTA TATTCTCTTC CAAACATACT ATCCTCATCA CCACATAGTT	240
CCTTTGTAA TGCTTTGTTT TAGACTTTCC CTTTCTGTT TTCTTATTCA AACCTATATC	300
TCTTTGCATA GATTGTAAAT TCAAATGCCC TCAGGGTGCA GGCAGTTCAT GTAAGGGAGG	360
GAGGCTAGCC AGTGAGATCT GCATCACACT GCTCGACTTA CA	402

(2) INFORMATION FOR SEQ ID NO:144:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 224 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:144:

TCGGGTGATG CCTCCTCAGG CCAAGAAGAT AAAGCTTCAG ACCCCTAACA CATTTCCAAA	60
AAGGAAGAAA GGAGAAAAA GGCATCATC CCCGTTCCGA AGGGTCAGGG AGGAGGAAAT	120
TGAGGTGGAT TCACGAGTTG CGGACAATC CTTTGATGCC AAGCGAGGTG CAGCCGGAGA	180

CTGGGGAGAG CGAGCCAATC AGGTTTGTAA GTTCCTCTCA GTGC

224

(2) INFORMATION FOR SEQ ID NO:145:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 111 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:145:

AGCCATTTAC CACCCATCCA CAAAAAAAAA AAAAAAAG AAAAATATCA AGGAATAAAA 60

ATAGACTTTG AACAAAAAGG AACATTTGCT GGCCTGAGGA GGCATCACCC G 111

(2) INFORMATION FOR SEQ ID NO:146:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 585 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:146:

TAGCATGTTG AGCCCAGACA CTTGTAGAGA GAGGAGGACA GTTAGAAGAA GAAGAAAAGT 60

TTTTAAATGC TGAAAGTTAC TATAAGAAAG CTTTGGCTTT GGATGAGACT TTAAAGATG 120

CAGAGGATGC TTTGCAGAAA CTTCATAAAT ATATGCAGGT GATTCCTTAT TTCCTCCTAG 180

AAATTTAGTG ATATTTGAAA TAATGCCCAA ACTTAATTTT CTCCTGAGGA AAATATTCT 240

ACATTACITA AGTAAGGCAI TATGAAAAGT TICTTTTTAG GTATAGTTTT TCCTAATTGG 300
GTTTGACATT GCTTCATAGT GCCTCTGTTT TTGTCCATAA TCGAAAGTAA AGATAGCTGT 360
GAGAAAAC TAACCTAAAT TTGGTATGTT GTTTGTAGAA ATGTCCTTAT AGGGAGCTCA 420
CCTGGTGGTT TTAAATTAT TGTGCTACT ATAATTGAGC TAATTATAAA AACCTTTTTG 480
AGACATATTT TAAATTGTCT TTTCCTGTAA TACTGATGAT GATGTTTTCT CATGCATTTT 540
CTTCTGAATT GGGACCATIG CTGCTGTGTC TGGGCTCACA TGCTA 585

(2) INFORMATION FOR SEQ ID NO:147:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 579 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:147:

TAGCATGTTG AGCCCAGACA CTGGGCAGCG GGGGTGGCCA CGGCAGCTCC TGCCGAGCCC 60
AAGCGTGT TTGTGTGAAG GACCCTGACG TCACCTGCCA GGCTAGGGAG GGGTCAATGT 120
GGAGTGAATG TTCACCGACT TTCGCAGGAG TGTGCAGAAG CCAGGTGCAA CTTGGTTTGC 180
TTGTGTTTAT CACCCCTCAA GATATGCACA CTGCTTTCCA AATAAAGCAT CAACTGTCAT 240
CTCCAGATGG GGAAGACTTT TTCTCCAACC AGCAGGCAGG TCCCCATCCA CTCAGACACC 300
AGCACGTCCA CCTTCTCGGG CAGCACCAGG TCCTCCACCT TCTGCTGGTA CACGGTGATG 360

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ATGTCAGCAA AGCCGTTCTG CANGACCAGC TGCCCCGTGT GCTGTGCCAT CTCACTGGCC 420
TCCACCGCGT ACACCGCTCT AGGCCGCGCA TANTGTGCAC AGAANAAATG ATGATCCAGT 480
CCCACAGCCC ACGTCCAAGA NGACTTTATC CGTCAGGGAT TCTTTATTCT GCAGGATGAC 540
CTGTGGTATT AATTGTTCGT GTCTGGGCTC AACATGCTA 579

(2) INFORMATION FOR SEQ ID NO:148:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 249 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:148:

TGACACCTTG TCCAGCATCT GCAAGCCAGG AAGAGAGTCC TCACCAAGAT CCCCACCCCG 60
TTGGCACCAG GATCTTGGAC TTCCAATCTC CAGAACTGTG AGAAATAAGT ATTTGTCGCT 120
AAATAAATCT TTGTGGTTTC AGATATTTAG CTATAGCAGA TCAGGCTGAC TAAGAGAAAC 180
CCCATAAGAG TTACATACTC ATTAATCTCC GTCTCTATCC CCAGGTCTCA GATGCTGGAC 240
AAGGTGTCA 249

(2) INFORMATION FOR SEQ ID NO:149:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 255 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:149:

TGACACCTTG TCCAGCATCT GCTATTTTGT GACTTTTTAA TAATAGCCAT TCTGACTGGT	60
GTGAGATGGT AACTCATTGT GGGTTTGGTC TGCATTTCTC TAATGATCAG TGATATTAAG	120
CTTTTTTAA ATAIGCTTGT TGACCACATG TATATCATCT TTTGAGAAGT GTCGTTCAT	180
ATCCTTTGCC CACTTTTTAA TTTTTTATC TTGIAAAITT GTTTAATTTT CTTACAGATG	240
CTGGACAAGG TGTC	255

(2) INFORMATION FOR SEQ ID NO:150:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 318 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:150:

TTACGCTGCA AACTGTGGA GGCCAAGCTG GGATCACTTTC TTCATTCTAA CTGGAGAGGA	60
GGGAAGTTCA AGTCCAGCAG AGGGTGGGTG GGTAGACAGT GGCACACAGA AATGTCAGCT	120
GGACCCCTGT CCCCGCATAG GCAGGACAGC AAGGCTGTGG CTCTCCAGGG CCAGCTGAAG	180
AACAGGACAC TGTCTCCGCT GCCACAAAGC GTCAGAGACT CCCATCTTTG AAGCACGGCC	240
TTCTTGGTCT TCCTGCACTT CCCTGTTCTG TTAGAGACCT GGTTATAGAC AAGGCTTCTC	300
CACAGTGTTG CAGCGTAA	318

(2) INFORMATION FOR SEQ ID NO:151:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 323 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:151:

TNACGCNGCN ACNNTGTAGA GANGGNAAGG CNTTCCCCAC ATTNCCCCTT CATNANAGAA	60
TTATTCNACC AAGNNTGACC NATGCCNTT ATGACTTACA TGCNNACTNC NTAATCTGTN	120
TCNNGCCTTA AAAGCANNTC CACTACATGC NTCANCACTG TNTGTGTNAC NTCATNAACT	180
GTCNGNAATA GGGGCNCATA ACTACAGAAA TGCANTTCAT ACTGCTTCCA NTGCCATCNG	240
CGTGTGGCCT TNCCTACTCT TCTTNTATTG CAAGTAGCAT CTCTGGANTG CTTCCCCACT	300
CTCCACATTG TTGCAGCNAT AAT	323

(2) INFORMATION FOR SEQ ID NO:152:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 311 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:152:

TCAAGATTCC ATAGGCTGAC CAGTCCAAGG AGAGTTGAAA TCATGAAGGA GAGTCTATCT	60
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GGAGAGAGCT GTAGTTTGA GGGTTGCAA GACTTAGGAT GGAGTTGGT GGTGTGGTTA 120
GTCTCIAAGG TTGATTTTGT TCATAAATTT CATGCCCTGA ATGCCCTGCT TGCCTCACCC 180
TGGTCCAAGC CTTAGTGAAC ACCTAAAAGT CTCTGTCTTC TTGCTCTCCA AACTTCTCCT 240
GAGGATTICC TCAGATTGTC TACATTCAGA TCGAAGCCAG TTGGCAAACA AGATGCAGTC 300
CAGAGGGTCA G 311

(2) INFORMATION FOR SFQ ID NO:153:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 332 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:153:

CAAGATTCCA TAGGCTGACC AGGAGGCTAT TCAAGATCTC TGGCAGTTGA GGAAGTCTCT 60
TTAAGAAAAT AGTTAAACA ATTTGTTAAA ATTTTCTGT CTACTTCAT TTCTGTAGCA 120
GTTGATATCT GGCTGTCCTT TTTATAATGC AGAGTGGGAA CTTTCCCTAC CATGTTTGAT 180
AAATGTTGTC CAGGCTCCAT TGCCAATAAT GTGTTGTCCA AAATGCCTGT TTAGTTTTTA 240
AAGACGGAAC TCCACCCTTT GCTTGGTCTT AAGTATGTAT GGAATGTTAT GATAGGACAT 300
AGTAGTAGCG GTGGTCAGCC TATGGAATCT TG 332

(2) INFORMATION FOR SEQ ID NO:154:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 345 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:154:

TCAAGATTCC ATAGGCTGAC CTGGACAGAG ATCTCCTGGG TCTGGCCAG GACAGCAGGC	60
TCAAGCTCAG TGGAGAAGGT TTCCATGACC CTCAGATTCC CCCAACCTT GGATTGGGTG	120
ACATTGCATC TCCTCAGAGA GGGAGGAGAT GTANGTCTGG GCTTCCACAG GGACCTGGTA	180
TTTTAGGATC AGGGTACCGC TGGCCTGAGG CTTGGATCAT TCANAGCCTG GGGGTGGAAT	240
GGCTGGCAGC CTGTGGCCCC ATTGAAATAG GCTCTGGGGC ACTCCCTCTG TTCCTANTTG	300
AACTGGGTA AGGAACAGGA ATGTGGTCAN CCTATGGAAT CTTGA	345

(2) INFORMATION FOR SEQ ID NO:155:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 295 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:155:

GACGCTTGGC CACTTGACAC ATTAAACAGT TTTGCATAAT CACTANCATG TATTCTAGT	60
TTGCTGTCTG CTGTGATGCC CTGCCCTGAT TCTCTGGCGT TAATGATGGC AAGCATAATC	120

AAACGCTGTT CTGTAATTC CAAGTTATAA CTGGCATTGA TTAAAGCATT ATCTTTCACA 180
ACTAAACTGT TCTTCATANA ACAGCCCAT A TIATTATCAA ATTAAGAGAC AATGTATTCC 240
AATATCCTTT ANGGCCAATA TATTTNATGT CCCTIAATTA AGAGCTACTG TCCGT 295

(2) INFORMATION FOR SEQ ID NO:156:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 406 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:156:

GACGCTTGGC CACTTGACAC TGCAGTGGGA AAACCAGCAT GAGCCGCTGC CCCCAGGAA 60
CCTCGAAGCC CAGGCAGAGG ACCAGCCATC CCAGCCTGCA GGTAAAGTGT GTCACCTGTC 120
AGGTGGGCTT GGGGTGAGTG GGTGGGGGAA GTGTGTGTGC AAAGGGGGTG TNAATGTNTA 180
TGCGTGTGAG CATGAGTGAT GGCTAGTG TG ACTGCATGTC AGGGAGTGTG AACAAGCGTG 240
CGGGGGTGTG TGTGCAAGTG CGTATGCATA TGAGAATATG TGTCTGTGGA TGAGTGCATT 300
TGAAAGTCTG TGTGTGTGCG TGTGGTCATG ANGGTAANTT ANTGACTGCG CAGGATGTGT 360
GAGTGTGCAT GGAACACTCA NTGTGTGTGT CAAGTGCCN ANCGTC 406

(2) INFORMATION FOR SEQ ID NO:157:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 208 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:157:

TGACGCTTGG CCACTTGACA CACTAAAGGG TGTTACTCAT CACTTTCTTC TCTCCTCGGT	60
GGCATGTGAG TGCATCTATT CACTTGGCAC TCATTGTTT GGCAGTGACT GTAANCCANA	120
TCTGATGCAT ACACCAGCTT GTAAATTGAA TAAATGTCTC TAATACTATG TGCTCACAAT	180
ANGGIANGGG TGAGGAGAAG GGGAGAGA	208

(2) INFORMATION FOR SEQ ID NO:158:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 547 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:158:

CTTCAACCTC CTTCAACCTC CTTCAACCTC CTGGATTCAA ACAATCATCC CACCTCAGAC	60
TCCTTAGTAG CTGAGACTAC AGACTCACGC CACTACATCT GGCTAAATTT TTGTAGAGAT	120
AGGGTTTCAT CATGTTGCCC TGGCTGGTCT CAAACTCCTG ACCTCAAGCA ATGTGCCAC	180
CTCAGCCTCC CAAAGTGCTG GGATTACAGG CATAAGCCAC CATGCCCAGT CCATNTTTAA	240
TCTTTCCTAC CACATTCTTA CCACACTTTC TTTATGTTT AGATACATAA ATGCTTACCA	300
TTATGATACA ATTGCCACA GTATTAAGAC AGTAACATGC TGCACAGGTT TGTAGCCTAG	360

GAACAGTAGG CAATACCACA TAGCTTAGGT GTGTGGTAGA CTATACCATC TAGGTTTGTG 420
TAAGTTACAC TTTATGCTGT TTACACAATG ACAAACCAT CTAATGATGC ATTTCTCAGA 480
ATGTATCCTT GTCAGTAAGC TATGATGTAC AGGGAACACT GCCCAAGGAC ACAGATATTG 540
TACCTGT 547

(2) INFORMATION FOR SEQ ID NO:159:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 203 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:159:

GTCCTCTTG CTTACCAAC TCACCCAGTA TGTCAGCAAT TTTATCRGCT TTACCTACGA 60
AACAGCCTGT ATCCAAACAC TTAACACACT CACCTGAAAA GTTCAGGCAA CAATCGCCTT 120
CTCATGGGTC TCTCTGCTCC AGTTCTGAAC CTTTCTCTTT TCCTAGAACA TGCATTTARG 180
TCGATAGAAG TTCCTCTCAG TGC 203

(2) INFORMATION FOR SEQ ID NO:160:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 402 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:160:

TGTAAGTCGA GCAGTGTGAT GGGTGGAACA GGGTTGTAAG CAGTAATTGC AAAGTGTATT	60
TAAACAATAA TAATAATATT TAGCATTTAT AGAGCACTTT ATATCTTCAA AGTACTTGCA	120
AACATTAYCT AATTAAATAC CCTCTCTGAT TATAATCIGG ATACAAATGC ACTTAAACTC	180
AGGACAGGGT CATGAGARAA GTATGCATTT GAAAGTTGGT GCTAGCTATG CTTTAAAAAC	240
CTATACAATG ATGGGRAAGT TAGAGTTCAG ATTCTGTTGG ACTGTITTTG TGCATTTTCA	300
TTCAGCCTGA TGGCAGAATT AGATCATATC TGCACTCGAT GACTYTGCTT GATAACTTAT	360
CACTGAAATC TGAGTGTGTA TCATCACACT GCTCGACTTA CA	402

(2) INFORMATION FOR SEQ ID NO:161:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 193 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:161:

AGCATGTTGA GCCCAGACAC TGACCAGGAG AAAAACCAAC CAATAGAAAC ACGCCCAGAC	60
ACTGACCAGG AGAAAAACCA ACCAATAAAA ACAGGCCCGG ACATAAGACA AATAATAAAA	120
TTAGCGGACA AGGACATGAA AACAGCTATT GTAAGAGCGG ATATAGTGGT GTGTGTCTGG	180
GCTCAACATG CTA	193

(2) INFORMATION FOR SEQ ID NO:162:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 147 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:162:

```
TGTTGAGCCC AGACTGAC CAGGAGAAAA ACCAACCAAT AAAACAGGC CCGGACATAA    60
GACAAATAAT AAAATTAGCG GACAAGGACA TGAAAACAGC TATTGTAAGA GCGGATATAG    120
TGGTGTGTGT CTGGGCTCAA CATGCTA                                         147
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(2) INFORMATION FOR SEQ ID NO:163:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 294 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:163:

```
TAGCATGTTG AGCCCAGACA CAAATCTTTC CTTAAGCAAT AAATCATTTT TGCATATGTT    60
TTTAAACCA CAGCTAAGCC ATGATTATTC AAAAGGACTA TTGTATTGGG TATTTTGATT    120
TGGGTTCTTA TCTCCCTCAC ATTATCTTCA TTTCTATCAT TGACCTCTTA TCCAGAGAC    180
TCTCAAACCT TTATGTTATA CAAATCACAT TCTGTCTCAA AAAATATCTC ACCCACTTCT    240
```

CTTCTGTTTC TCGGTGTGTA TGTGTGTGTG TGTGTGTCTG GGCTCAACAT GCTA 294

(2) INFORMATION FOR SEQ ID NO:164:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 412 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:164:

CGGGATTGGC TTTGAGCTGC AGATGCTGCC TGTGACCGCA CCCGGCGTGG AACAGAAAGC 60
CACCTGGCTG CAAGTGC GCC AGAGCCGCC TGA CTGCTGTGGG GCTGGGGCGT 120
GATGAACTCC ACCGCCCTGA AGGAAGCCCA GGCCACCGGA TACCCCGCG ACAAGATGTA 180
CGGCGTGTGG TGGGCCGGTG CGGAGCCCGA TGTGCGTGAC GTGGGCGAAG GCGCCAAGGG 240
CTACAACGCG CTGGCTCTGA ACGGCTACGG CACGCAGTCC AAGGTGATCC ANGACATCCT 300
GAAACACGTG CACGACAAGG GCCAGGGCAC GGGGCCCAAA GACGAAGTGG GCTCGGTGCT 360
GTACACCCGC GCGTGATCA TCCAGATGCT GGACAAGGTG TCAATCACTA AT 412

(2) INFORMATION FOR SEQ ID NO:165:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 361 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:165:

TTGACACCTT GTCCAGCATC TGCATCTGAT GAGAGCCTCA GATGGCTACC ACTAATGGCA	60
GAAGGCAAAG GAGAACAGGC ATTGTATGGC AAGAAAGGAA GAAAGAGAGA GGGGAGAAAG	120
GTGCTAGGTT CTTTCAACA ACCAGTTCTT GATGGAAGT AGAGTAAGAG CTCAAGGCCA	180
GGTGTGGTGA C'CCAACCAG TAATCCCAAC ATTTTAGGAG GCTGAGGCAG GCAGATGTCT	240
TGACCCCATG AGTTTGTGAC CAGCCTGAAC AACATCATGA GACTCCATCT CTACAATAAT	300
TACAAAAATT AATCAGGCAT TGTGGTATGC CCTGTAGTCC CAGATGCTGG ACAAGGTGTC	360
A	361

(2) INFORMATION FOR SEQ ID NO:166:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 427 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:166:

TWGACTGACT CATGTCCCTT ACACCCAAT ATCTTCTCCA GGTGGCCAGG CATGATAGAA	60
TCTGATCCTG ACTTAGGGGA ATATTTTCTT TTTACTTCCC ATCTTGATTG CCTGCCGGTG	120
AGTTTCCTGG TTCAGGGTAA GAAAGGAGCT CAGGCCAAAG TAAIGAACAA ATCCATCCTC	180
ACAGACGTAC AGAATAAGAG AACWTGGACW TAGCCAGCAG AACMCAAKTG AAAMCAGAAC	240
MCTTAMCTAG GATRACAAMC MCRRARATAR KTGCYCMCMC WTATAATAGA AACCAAACCTT	300

GTATCTAATT AAATATTTAT CCACYGTCAG GGCATTAGTG GTTTTGATAA ATACGCTTTG 360
GCTAGGATTCT CTGAGGTTAG AATGGAARAA CAATTGCAMC GAGGGTAGGG GACATGAGTC 420
AKTCTAA 427

(2) INFORMATION FOR SEQ ID NO:167:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 500 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:167:

AACGTCGCAT GCTCCCGGCC GCCATGGCCG CGGGATAGAC TGA CTCATGT CCCCTAAGAT 60
AGAGGAGACA CCTGCTAGGT GTAAGGAGAA GATGGTTAGG TCTACGGAGG CTCCAGGGTG 120
GGAGTAGTTC CCTGCTAAGG GAGGGTAGAC TGTTC AACCT GTTCCTGCTC CGGCCTCCAC 180
TATAGCAGAT GCGAGCAGGA GTAGGAGAGA GGGAGGTAAG AGTCAGAAGC TTATGTTGTT 240
TATGCGGGGA AACGCCRTAT CGGGGGCAGC CRAGTTATTA GGGGACANTR TAGWYARTCW 300
AGNTAGCATC CAAAGCGNGG GAGTTNTCCC ATATGGTTGG ACCTGCAGGC GGCCGCATTA 360
GTGATTAGCA TGTGAGCCCC AGACACGCAT AGCAACAAGG ACCTAAACTC AGATCCTGTG 420
CTGATTACTT AACATGAATT ATTGTATTTA TTTAACAAC TTAGATTATG AGGCATATTA 480

TTAGGTCCAT ATTACCTGGA

500

(2) INFORMATION FOR SEQ ID NO:168:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 358 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:168:

TTCATCGCTC GGTGACTCAA GCCTGTAATC CCAGAACTTT GGGAGGCCGA GGGGAGCAGA	60
TCACCTGAGG TTGGGAGTTT GAGACCAGCC TGGCCAACAT GGTGACAACC CGTCTCTGCT	120
AAAAATACAA AAATTAGCCA AGCATGGTGG CATGCACTTG TAATCCCAGC TACTCGGGAG	180
GCTGAGGCAG GAGAATCACT TGAGGCCAGG AGGCAGAGGT TGCAGTGAGG CAGAGGTTGA	240
GATCATGCCA CTGCACTCCA GCCTGGGCAA CAGAGTAAGA CTCCATCTCA AAAAAAAAAA	300
AAAAAAGAA TGATCAGAGC CACAAATACA GAAACCTTG AGTCACCGAG CGATGAAA	358

(2) INFORMATION FOR SEQ ID NO:169:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1265 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:169:

TTCTGTCCAC ACCAATCTTA GAGCTCTGAA AGAATTTGTC TTAAATATC TTTAATAGT	60
AACATGTATT TTATGGACCA AATTGACATT TTCGACTATT TTTCCCAA AAAAGTCAGG	120
TGAATTTAG CACACTGAGT TGGGAATTC TTATCCAGA AGWCGGCACG AGCAATTTCA	180
TATTTATTTA AGATTGATC CATACTCCGT TTTCAAGGAG AATCCCTGCA GTCTCCTAA	240
AGGTAGAACA AATACTTTCT ATTTTTTTTT CACCATTGTG GGATTGGACT TTAAGAGGTG	300
ACTCTAAAA AACAGAGAAC AAATATGTCT CAGTTGTATT AAGCACGGAC CCATATTATC	360
ATATTCACCT AAAAAATGA TTTCTGTGC ACCTTTGGC AACTTCTCTT TTCAATGTAG	420
GGAAAACTT AGTCACCCTG AAAACCCACA AAATAAATAA AACTTGTAGA TGTGGGCAGA	480
ARGTTTGGG GTGGACATTG TATGTGTTA AATTAAACC TGTATCACTG AGAAGCTGT	540
GTATGGTCA GAGAAATGA ATGCTTAGAA GCTGTTTACA TCTCAAGAG CAGAAGCAAA	600
CCACATGTCT CAGCTATATT ATTATTTATT TTTATGCAT AAAGTGAATC ATTTCTTCTG	660
TATTAATTC CAAAGGGTTT TACCCTCTAT TTAAATGCTT TGAACACAG TGCATTGACA	720
ATGGGTGAT ATTTTCTTT AAAAGAAAA TATAATTATG AAAGCCAAGA TAATCTGAAG	780
CCTGTTTTAT TTTAAACTT TTTATGTCT GTGGTTGATG TTGTTGTTT GTTGTTTCT	840
ATTTGTTGG TTTTTACTT TTTTTTTGT TTTGTTTGT TTTGGTTTG CATACTACAT	900
GCAGTTTCTT TAACCAATGT CTGTTTGGCT AATGTAATTA AAGTTGTTA TTTATATGAG	960
TGCATTTCAA CTATGTCAAT GGTTCCTAA TATTTATTGT GTAGAAGTAC TGGTAATTTT	1020
TTTATTTACA ATATGTTTAA AGAGATAACA GTTTGATATG TTTTCATGTG TTTATAGCAG	1080

AAGTTATTTA TTTCTATGGC ATTCCAGCGG ATATTTTGGT GTTTGCGAGG CATGCAGTCA 1140
ATATTTTGTA CAGTTAGTGG ACAGTATTCA GCAACGCCTG ATAGCTTCTT TGGCCTTATG 1200
TTAAATAAAA AGACCTGTTT GGGATGTAAA AAAAAAAAAA AAAAAAAAAA AAAAAAAAAA 1260
AAAAA 1265

(2) INFORMATION FOR SEQ ID NO:170:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 383 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:170:

TGTAAGTCGA GCAGTGTGAT GACGATATTC TTCTTATTAA TGTGGTAATT GAACAAATGA 60
TCTGTGATAC TGATCCTGAG CTAGGAGGCG CTGTTCA GTT AATGGGACTT CTTCGTACTC 120
TAATTGATCC AGAGAACATG CTGGCTACAA CTAATAAAAC CGAAAAAAGT GAATTTCTAA 180
ATTTTTTCTA CAACCATTTGT ATGCATGTTT TCACAGCACC ACTTTTGACC AATACTTCAG 240
AAGACAAATG TGAAAAGGAT AATATAGTTG GATCAAAACA AAACAACACA ATTTGTCCCG 300
ATAATTATCA AACAGCACAG CTA CTGCTT TAATTTTAGA GTTACTCACA TTTTGTGTGG 360
AACATCACAC TGCTCGACTT ACA 383

(2) INFORMATION FOR SEQ ID NO:171:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 383 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:171:

```
TGGGCACCTT CAATATCGCA AGTAAAAAT AATGTTGAGT TTATTATACT TTTGACCTGT    60
TTAGCTCAAC AGGGTGAAGG CATGTAAAGA ATGTGGACTT CTGAGGAATT TTCTTTTAA    120
AAGAACATAA TGAAGTAACA TTTTAATTAC TCAAGGACTA CTTTGGTTG AAGTTTATAA    180
TCTAGATACC TCTACTTTTT GTTTTGTCTG TTCGACAGTT CACAAAGACC TTCAGCAATT    240
TACAGGGTAA AATCGTTGAA GTAGTGGAGG TGAAACTGAA ATTTAAAATT ATTCTGTAAA    300
TACTATAGGG AAAGAGGCTG AGCTTAGAAT CTTTGGTTG TTCATGTGTT CTGTGCTCTT    360
ATCATCACAC TGCTCGACTT ACA                                           383
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(2) INFORMATION FOR SEQ ID NO:172:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 699 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:172:

```
TCGGGTGATG CCTCCTCAGG CTTGTCGTTA GTGTACACAG AGCTGCTCAT GAAGCGACAG    60
```

CGGCTGCCCC TGGCACTTCA GAACCTCTTC CTCTACACTT TTGGTGCGCT TCTGAATCTA 120
GGTCTGCATG CTGGCGGCGG CTCTGGCCCA GGCTCCTCG AAAGTTTCTC AGGATGGGCA 180
GCACTCGTGG TGCTGAGCCA GGCATAAAT GGA CTGCTCA TGTCTGCTGT CATGGAGCAT 240
GGCAGCAGCA TCACACGCT CTTTGTGGTG TCCTGCTCGC TGGTGGTCAA CGCCGTGCTC 300
TCAGCAGTCC TGCTACGGCT GCAGCTACA GCCGCCTTCT TCCTGGCCAC ATTGCTCATT 360
GGCTGGCCA TGGCCTGTA CTATGGCAGC CGCTAGTCCC TGACAACTTC CACCCTGATT 420
CCGGACCCTG TAGATTGGGC GCCACCACCA GATCCCCCTC CCAGGCCTTC CTCCTCTCC 480
CATCAGCGGC CCTGTAACAA GTGCCTTGTG AGAAAGCTG GAGAAGTGAG GGCAGCCAGG 540
TTATTCTCTG GAGGTTGGTG GATGAAGGGG TACCCCTAGG AGATGTGAAG TGTGGGTTTG 600
GTTAAGGAAA TGCTTACCAT CCCCCACCCC CAACCAAGTT NTTCCAGACT AAAGAATTAA 660
GGTAACATCA ATACCTAGGC CTGAGGAGGC ATCACCCGA 699

(2) INFORMATION FOR SEQ ID NO:173:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 701 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:173:

TCGGGTGATG CCTCTCAGG CCAGATCAAA CTTGGGGTTG AAACTGTGC AAAGAAATCA 60
ATGTCGGAGA AAGAATTTTG CAAAAGAAAA ATGCCTAATC AGTACTAATT TAATAGGTCA 120

CATTAGCAGT GGAAGAAGAA ATGTTGATAT TTTATGTCAG CTATTTTATA ATCACCAGAG 180
TGCTTAGCTT CATGTAAGCC ATCTCGTATT CATTAGAAAT AAGAACAATT TTATTCGTCG 240
GAAAGAACTT TTCAATTTAT AGCATCTTAA TTGCTCAGGA TTTTAAATTT TGATAAAGAA 300
AGCTCCACTT TTGGCAGGAG TAGGGGGCAG GGAGAGAGGA GGCTCCATCC ACAAGGACAG 360
AGACACCAGG GCCACTAGGG TAGCTGGTGG CTGGATCAGT CACAACGGAC TGACTTATGC 420
CATGAGAAGA AACAACCTCC AAATCTCAGT TGCTTAATAC AACACAAGCT CATTTCTTGC 480
TCACGTTACA TGTCCTATGT AGATCAACAG CAGGTGACTC AGGGACCCAG GCTCCATCTC 540
CATATGAGCT TCCATAGTCA CCAGGACACG GGCTCTGAAA GTGTCTCTCA TGCAGGGACA 600
CATGCCTCTT CCTTTCATTG GGCAGAGCAA GTCACCTATG GCCAGAAGTC AACTGCAGG 660
GCAGTGCCAT CCTGCTGTAT GCCTGAGGAG GCATCACCCG A 701

(2) INFORMATION FOR SEQ ID NO:174:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 700 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:174:

TCGGGTGATG CCTCTCANG CCCCTAAATC AGAGTCCAGG GTCAGAGCCA CAGGAGACAG 60
GGAAAGACAT AGATTTTAAAC CGGCCCCCTT CAGGAGATTC TGAGGCTCAG TTCACCTTGT 120

TGCAGTTTGA ACAGAGGCAG CAAGGCTAGT GGTTAGGGGC ACGGTCTCTA AAGCTGCACT 180
GCCTGGATCT GCCTCCCAGC TCTGCCAGGA ACCAGCTGCG TGGCCTTGAG CTGCTGACAC 240
GCAGAAAGCC CCCTGTGGAC CCAGTCTCCT CGTCTGTAAG ATGAGGACAG GACTCTAGGA 300
ACCCTTTCCC TTGGTTTGGC CTCACTTTCA CAGGCTCCCA TCTTGAATC TATCTACTCT 360
TTTCCTGAAA CCTTGTA AAAAAGTG CTAGCCTGGG CAACATGGCA AAACCCTGTC 420
TCTACAAAA ATACAAAAAT TAGTTGGGTG TGGTGGCATG TGCCTGTAGT CCCAGCCACT 480
TGGGAGGTGC TGAGGTGGGA GGATCACTTG AGCCCGGGAG GTGGAGGTG CAGTGAGCCA 540
AGATCATGCC ACTGCACTCC AGCCTGAGTA ATAGAGTAAG ACTCTGTCTC AAAACAACA 600
ACAACAACAG TGAGTGTGCC TCTGTTTCCG GGTTGGATGG GGCACCACAT TTATGCATCT 660
CTCAGATTG GACGCTGCAG CCTGAGGAGG CATCACCCGA 700

(2) INFORMATION FOR SEQ ID NO:175:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 484 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:175:

TATAGGGCGA ATTGGGCCCG AGTTGCATGN TCCCGGCCGC CATGGCCGCG GGATTGCGGT 60
GATGCCTCCT CAGGCTTGTC TGCCACAAGC TACTTCTCTG AGCTCAGAAA GTGCCCTTG 120
ATGAGGGAAA ATGTCCTACT GCACTGCGAA TTTCTCAGTT CCATTTTACC TCCAGTCCT 180

CCTTCTAAAC CAGTTAATAA ATTCATTCCA CAAGTATTTA CTGATTACCT GCTTGTGCCA 240
GGGACTATTC TCAGGCTGAA GAAGGTGGGA GGGGAGGGCG GAACCTGAGG AGCCACCTGA 300
GCCAGCTTTA TATTTCAACC ATGGCTGGCC CATCTGAGAG CATCTCCCCA CTCTCGCCAA 360
CCTATCGGGG CATAGCCCAG GGATGCCCCC AGGCGGCCCA GGTTAGATGC GTCCCTTTGG 420
CTTGTCAGTG ATGACATACA CCTTAGCTGC TTAGCTGGTG CTGGCCTGAG GAGGCATCAC 480
CCGA 484

(2) INFORMATION FOR SEQ ID NO:176:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 432 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:176:

TCGGGTGATG CCTCTCAGG GCTCAAGGGA TGAGAAGTGA CTTCTTTCTG GAGGGACCGT 60
TCATGCCACC CAGGATGAAA ATGGATAGGG ACCCACTTGG AGGACTTGCT GATATGTTTG 120
GACAAATGCC AGGTAGCGGA ATTGGTACTG GTCCAGGAGT TATCCAGGAT AGATTTTCAC 180
CCACCATGGG ACGTCATCGT TCAAATCAAC TCTTCAATGG CCATGGGGGA CACATCATGC 240
CTCCACACA ATCGCAGTTT GGAGAGATGG GAGGCAAGTT TATGAAAAGC CAGGGGCTAA 300
GCCAGTCTA CCATAACCAG AGTCAGGGAC TCTTATCCCA GCTGCAAGGA CAGTCGAAGG 360

ATATGCCACC TCGGTTTTCT AAGAAAGGAC AGCTTAATGC AGATGAGATT AGCCTGAGGA 420

GGCATCACCC GA 432

(2) INFORMATION FOR SEQ ID NO:177:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 788 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:177:

TAGCATGTTG AGCCCAGACA CAGTAGCATT TGTGCCAATT TCTGGTTGGA ATGGTGACAA 60

CATGCTGGAG CCAAGTGCTA ACATGCCTTG GTTCAAGGGA TGGAAAGTCA CCCGTAAGGA 120

TGGCAATGCC AGTGGAACCA CGCTGCTTGA GGCTCTGGAC TGCATCCTAC CACCAACTCG 180

CCCAACTGAC AAGCCCTTGC GCCTGCCTCT CCAGGATGTC TACAAAATTG GTGGTATTGG 240

TACTGTTCTT GTTGGCCGAG TGGAGACTGG TGTTCTCAA CCCGGTATGG TGGTCACCTT 300

TGCTCCAGTC AACGTTACAA CGGAAGTAAA ATCTGTGAA ATGCACCATG AAGCTTTGAG 360

TGAAGCTCTT CCTGGGGACA ATGTGGGCTT CAATGTCAAG AATGTGTCTG TCAAGGATGT 420

TCGTCGTGGC AACGTTGCTG GTGACAGCAA AAATGACCCA CCAATGGAAG CAGCTGGCTT 480

CACTGCTCAG GTGATTATCC TGAACCATCC AGGCCAAATA AGTGCCGGCT ATGCCCTGT 540

ATTGGATTGC CACACGGCTC ACATTGCATG CAAGTTTGCT GAGCTGAAGG AAAAGATTGA 600

TCGCCGTCTT GGTAAAAAGC TGAAGATGG CCCTAAATTC TTGAAGTCTG GTGATGCTGC 660

CATTGTTGAT ATGGTTCCTG GCAAGCCCAT GTGTGTTGAG AGCTTCTCAG ACTATCCACC 720
TTTGGGTCGC TTTGCTGTTT GTGATATGAG ACAGACAGTT GCGGTGGGTG TCTGGGCTCA 780
ACATGCTA 788

(2) INFORMATION FOR SEQ ID NO:178:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 786 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:178:

TAGCATGTTG AGCCAGACA CCTGTGTTT TGGGAGCTCT GGCAGTGGCG GATTCATAGG 60
CACTTGGGCT GCACTTTGAA TGACACACTT GGCTTTATTA GATTCAGTAG TTTTAAAAA 120
ATTGTTGTTT GTTTCTTTT ATTAAGGTT TAATCAGACA GATCAGACAG CATAATTTTG 180
TATTTAATGA CAGAAACGTT GGTACATTTT TTCATGAATG AGCTTGCATT CTGAAGCAAG 240
AGCCTACAAA AGGCACTTGT TATAAATGAA AGTTCTGGCT CTAGAGGCCA GTACTCTGGA 300
GTTTCAGAGC AGCCAGTGAT TGTCCAGTC AGTGATGCCT AGTTATATAG AGGAGGAGTA 360
CACTGTGCAC TCTTCTAGGT GTAAGGGTAT GCAACTTTGG ATCTTAAAT TCTGTACACA 420
TACACACTTT ATATATATGT ATGTATGTAT GAAAACATGA AATTAGTTTG TCAAATATGT 480
GTGTGTTTAG TATTTAGCT TAGTGCAACT ATTTCCACAT TATTTATTAA ATTGATCTAA 540

GACACTTTCT TGTGACACC TTGAATATTA ATGTTCAAGG GTGCAATGTG TATTCCTTTA 600
GATTGTAAA GCTTAATTAC TATGATTTGT AGTAAATTAA CTTTIAAAAT GTATTTGAGC 660
CCTTCTGTAG TGTCGTAGGG CTCTTACAGG GTGGGAAAGA TTTTAATTTT CCAGTTGCTA 720
ATTGAACAGT ATGGCCTCAT TATATATTTT GATTTATAGG AGTTTGTGTC TGGGCTCAAC 780
ATGCTA 786

(2) INFORMATION FOR SEQ ID NO:179:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 796 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:179:

TAGCATGTTG AGCCAGACA CTGGTTACAA GACCAGACCT GCTTCCTCCA TATGTAACA 60
GCTTTTAAAA AGCCAGTGAA CCTTTTAAAT ACTTTGGCAA CCTTCTTTCA CAGGCAAAGA 120
ACACCCCAT CCGCCCTTG TTTGGAGTGC AGAGTTTGGC TTGGTTCTT TGCCTTGCCT 180
GGAGTATACT TCTAATTCCT GTTGTCTGC ACAAGCTGAA TACCGAGCTA CCCACGCCA 240
CCCAGGCCAG GTTCCACTC ATTTATTACT TTATGTTTCT GTTCCATTGC TGGTCCACAG 300
AAATAAGTTT TCCTTTGGAG GAATGTGATT ATACCCCTTT AATTTCCTCC TTTTGCTTTT 360
TTTAAATATC ATTGGTATGT GTTTGGCCCA GAGGAACTG AAATTCACCA TCATCTTGAC 420
TGGCAATCCC ATTACCATGC TTTTTTAAA AACGTAATT TTTCTTGCCT TACATTGGCA 480

GAGTAGCCCT TCCTGGCTAC TGGCTTAATG TAGTCACTCA GTTCTAGGT GGCATTAGGC 540
ATGAGACCTG AAGCACAGAC TGTCTTACCA CAAAAGGTGA CAAGATCTCA AACCTTAGCC 600
AAAGGGCTAT GTCAGGTTTC AATGCTATCT GCTTCTGTTC CTGCTCACTG TTCTGGATT 660
TGTCCTTCTT CATCCCTAGC ACCAGAATTT CCCAGTCTCC CTCCTACCT TCCCTTGTTT 720
TAATTCTAAT CTATCAGCAA AATAACTTTT CAAATGTTTT AACCGGTATC TCCATGTGTC 780
TGGGCTCAAC ATGCTA 796

(2) INFORMATION FOR SEQ ID NO:180:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 488 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:180:

GGATGTGCTG CAAGGCGATT AAGTTGGTA ACGCCAGGGT TTTCCAGTC ACGACGTTGT 60
AAAACGACGG CCAGTGAATT GTAATACGAC TCACTATAGG GCGAATTGGG CCCGACGTCG 120
CATGCTCCCG GCCGCCATGG CCGCGGGATA GCATGTTGAG CCCAGACACC TGCAGGTCAT 180
TTGGAGAGAT TTTTCACGTT ACCAGCTTGA TGGTCTTTTT CAGGAGGAGA GACACTGAGC 240
ACTCCCAAGG TGAGGTTGAA GATTTCCTCT AGATAGCCGG ATAAGAAGAC TAGGAGGGAT 300
GCCTAGAAAA TGATTAGCAT GCAAATTTCT ACCTGCCATT TCAGAACTGT GTGTCAGCCC 360

ACATTCAGCT GCTTCTTG TG AACTGAAAAG AGAGAGGTAT TGAGACTTTT CTGATGGCCG 420
CTCTAACATT GTAACACAGT AATCTGTGTG TGTGTGGGTG TGTGTGTGTG TCTGGGCTCA 480
ACATGCTA 488

(2) INFORMATION FOR SEQ ID NO:181:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 317 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:181:

TAGCATGTTG AGCCAGACA CGGCGACGGT ACCTGATGAG TGGGGTGATG GCACCTGTGA 60
AAAGGAGGAA CGTCATCCCC CATGATATTG GGGACCCAGA TGATGAACCA TGGCTCCGCG 120
TCAATGCATA TTTAATCCAT GATACTGCTG ATTGGAAGGA CCTGAACCTG AAGTTTGTGC 180
TGCAGGTTTA TCGGGACTAT TACCTCACGG GTGATCAAAA CTTCTGAAG GACATGTGGC 240
CTGTGTGTCT AGTAAGGGAT GCACATGCAG TGGCCAGTGT GCCAGGGGTA TGGTTGGTGT 300
CTGGGCTCAA CATGCTA 317

(2) INFORMATION FOR SEQ ID NO:182:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 507 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:182:

TAGCATGTTG AGCCCAGACA CTGGCTGTTA GCCAAATCCT CTCTCAGCTG CTCCTGTGG 60
TTTGGTGACT CAGGATTACA GAGGCATCCT GTTTCAGGGA AAAAAAGAT TTAGCTGCC 120
AGCAGAGAGC ACCACATACA TTAGAATGGT AAGGACTGCC ACCTCCTTCA AGAACAGGAG 180
TGAGGGTGGT GGTGAATGGG AATGGAAGCC TGCATTCCCT GATGCATTTG TGCTCTCTCA 240
AATCCTGTCT TAGTCTTAGG AAAGGAAGTA AAGTTTCAAG GACGGTTCCG AACTGCTTTT 300
TGTGTCTGGG CTCAACATGC TATCCCGCGG CCATGGCGGC CGGGAGCATG CGACGTCGGG 360
CCCAATTCGC CCTATAGTGA GTCGTATTAC AATCACTGG CCGTCGTTTT ACAACGTCGT 420
GACTGGGAAA ACCCTGGCGT TACCCAACCTT AATCGCCTTG CAGCACATCC CCCTTTCCCA 480
GCTGGCGTAA TANCGAAAAG GCCCGCA 507

(2) INFORMATION FOR SEQ ID NO:183:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 227 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:183:

GATTACGCT GCAACACTGT GGAGGTAGCC CTGGAGCAAG GCAGGCATGG ATGCTTCTGC 60
AATCCCCAAA TGGAGCCTGG TATTTAGCC AGGAATCTGA GCAGAGCCCC CTCTAATTGT 120

AGCAATGATA AGTTATCTC TTTGTTCTC AACCTTCAA TAGCCTTGAG CTTCCAGGGG 180

AGTGTGTTA ATCATTACAG CCTGGTCTCC ACAGTGTTC AGCGTAA 227

(2) INFORMATION FOR SEQ ID NO:184:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 225 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:184:

TTACGCTGCA ACACTGTGGA GCAGATTAAC ATCAGACTTT TCTATCAACA TGACTGGGGT 60

TACTAAAAAG ACAACAAATC AATGGCTTCA AAAGTCTAAG GAATAATTTC GATACTTCAA 120

CTTTATAAAA CTGACAAAA CTATCAATCA AGCATAAAGA CAGATGAAGA ACATTTCCAG 180

ATTTTGGCCA ATCAGATATT TTACCTCCAC AGTGTTCAG CGTAA 225

(2) INFORMATION FOR SEQ ID NO:185:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 597 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:185:

GGCCCGACGT CGCATGCTCC CGGCCGCCAT GGCCGCGGGA TTCGTTAGGG TCTCTATCCA 60

CTGGGACCCA TAGGCTAGTC AGAGTATTTA GAGTTGAGTT CTTTCTGCT TCCCAGAATT 120
TGAAAGAAAA GGAGTGAGGT GATAGAGCTG AGAGATCAGA TTTGCCTCTG AAGCCTGTTC 180
AAGATGTATG TGCTCAGACC CCACCACTGG GGCCTGTGGG TGAGGTCCTG GGCATCTATT 240
TGAATGAATT GCTGAAGGGG AGCACTATGC CAAGGAAGGG GAACCCATCC TGGCACTGGC 300
ACAGGGGTCA CCTTATCCAG TGCTCAGTGC TTCTTTGCTG CTACCTGGTT TTCTCTCATA 360
TGTGAGGGGC AGGTAAGAAG AAGTGCCCRG TGTGTGCGA GTTTTAGAAC ATCTACCAGT 420
AAGTGGGGAA GTTTCACAAA GCAGCAGCTT TGTTTGTGT ATTTTCACCT TCAGTTAGAA 480
GAGGAAGGCT GTGAGATGAA TGTTAGTTGA GTGGAAAAGA CGGGTAAGCT TAGTGGATAG 540
AGACCCTAAC GAATCACTAG TCGGCCGCC TTGCAGGTCG ACCATATGGG AGAGCTC 597

(2) INFORMATION FOR SEQ ID NO:186:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 597 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:186:

GGCCCGAAGT TGCATGTTCC CGGCCGCCAT GGCCGCGGGA TTCGTTAGGG TCTCTATCCA 60
CTACCTAAAA AATCCCAAAC ATATACTGA ACTCCTCACA CCCAATTGGA CCAATCCATC 120
ACCCAGAGG CCTACAGATC CTCCTTTGAT ACATAAGAAA ATTTCCCAA ACTACCTAAC 180

TATATCATTT TGCAAGATTT GTTTTACCAA ATTTTGATGG CCTTCTGAG CTTGTCAGTG 240
TGAACCACTA TTACGAACGA TCGGATATTA ACTGCCCTC ACCGTCCAGG TGTAGCTGGC 300
AACATCAAGT GCAGTAAATA TTCATTAAGT TTTCACCTAC TAAGGTGCTT AACACCCTA 360
GGGTGCCATG TCGGTAGCAG ATCTTTTGAT TTGTTTTTAT TCCCATAGG GGTCTGTTC 420
AAGGTCAATC ATACATGTAG TGTGAGCAGC TAGTCACTAT CGCATGACTT GGAGGGTGAT 480
AATAGAGGCC TCCTTTGCTG TTAAGAACT CTTGTCCAG CCTGTCAAAG TGGATAGAGA 540
CCCTAACGAA TCACTAGTGC GGCCGCCTGC AGGTCGACCA TATGGGAGAG CTCCCAA 597

(2) INFORMATION FOR SEQ ID NO:187:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 324 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:187:

TCGTTAGGGT CTCTATCCAC TTGCAGGTAA AATCCAATCC TGTGTATATC TTATAGTCTT 60
CCATATGTAG TGGTTCAAGA GACTGCAGTT CCAGAAAGAC TAGCCGAGCC CATCCATGTC 120
TTCCACTTAA CCCTGCTTTG GGTACACAT CTTAACTTTT CTGTTCAAGT TTCTCTGTGT 180
AGTTTATAGC ATGAGTATTG GGAWAATCCC CTGAAACCTG ACATGAGATC TGGGAAACAC 240
AACTTACTC AATAAGAATT TCTCCATAT TTTTATGATG GAAAAATTC ACATGCACAG 300
AGGAGTGGAT AGAGACCCTA ACGA 324

(2) INFORMATION FOR SEQ ID NO:188:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 178 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:188:

```
GC GCGGGGAT TCGGGGTGAT ACCTCCTCAT GCCAAAATAC AACGTNTAAT TTCACAAC TT      60
GCCTTCCAAT TTACGCATTT TCAATTTGCT CTCCCATTG GTTGAGTCAC AACAAACACC      120
ATTGCCCAGA AACATGTATT ACCTAACATG CACATACTCT TAAACTACT CATCCCTT      178
```

(2) INFORMATION FOR SEQ ID NO:189:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 367 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:189:

```
TGACACCTTG TCCAGCATCT GACACAGTCT TGGCTCTTGG AAAATATTGG ATAAATGAAA      60
ATGAATTTCT TTAGCAAGTG GTATAAGCTG AGAATATACG TATCACATAT CCTCATTCTA      120
AGACACATTC AGTGTCCCTG AAATTAGAAT AGGACTTACA ATAAGTGTGT TCACTTTCTC      180
AATAGCTGTT ATTCAATTGA TGGTAGGCCT TAAAAGTCAA AGAAATGAGA GGGCATGTGA      240
```

AAAAAAGCTC AACATCACTG ATCATTAGAA AACTTCCATT CAAACCCCA ATGAGATACC 300
ATCTCATACC AGTCAGAATG GCTATTATTA AAMGTCAA AAATAACAGA TGCTGGACAA 360
GGTGCA 367

(2) INFORMATION FOR SEQ ID NO:190:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 369 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:190:

GACACCTTGT CCAGCATCTG ACAACGCTAA CAGCCTGAGG AGATCTTTAT TTATTTATTT 60
AGTTTTTACT CTGGCTAGGC AGATGGTGGC TAAACATTC ATTTACCCAT TTATTCATT 120
AATTGTTCTT GCAAGGCCTA TGGATAGAGT ATGTCCAGC ACTGCTCTGG AAGCTAGGAG 180
CATGGGGATG AACAAGATAG GCTACATCCT GTTCCACAG AACTTCCA CT TTAGTCTGGG 240
AAACAGATGA TATATACAAA TATATAAATG AATTCAGGTA GTTTAAGTA CGAAAAGAAT 300
AAGAAAGCAG AGTCATGATT TANAATGCTG GAAACAGGGG CTATTGCTTG AGATATTGAA 360
GGTGCCCAA 369

(2) INFORMATION FOR SEQ ID NO:191:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 369 base pairs

(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:191:

TGACACCTTG TCCAGCATCT GCACAGGGAA AAGAACTAT TATCAGAGTG AACAGGCAAC	60
CTACAGAATG GGAGAAAATT TTTGCAATCT ATCCATCTGA CAAAGGGCTA ATATCCAGAA	120
TCTACAAAGA ACTTATACAA ATTTACAAGA AACAAACAAA CAAACAACCTC CTCAAAAAGT	180
GGGTGAAGGA TGTGAACAGA CACTTCTCAA AAGAAGACAT TTATGGGGCC AACAAACATA	240
TGAAAAAAG CTCATCATCA CTGGTCACTA GATAAATGCA AATCAAAACC ACAATGAGAT	300
ACCATCTCAT TCCAGTTAGA ATGGCAATCA TTA AAAAGTC AGGAAACAAC AGATGCTGGA	360
CAAGGTGTC	369

(2) INFORMATION FOR SEQ ID NO:192:

(i) SEQUENCE CHARACTERISTICS:
(A) LENGTH: 449 base pairs
(B) TYPE: nucleic acid
(C) STRANDEDNESS: single
(D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:192:

TGACGCTTGG CCACTTGACA CTTTCATCTT GCACAGAAAA ACTTCTTTAC AGATTTAATT	60
CAAGACTGGT CTAGTGACAG TCCTCCAGAC ATTTTTCAT TTGTTCCATA TACGTGGAAT	120

TTTAAAATCA TGTTTCATCA GTTTGAAATG ATTTGGGCTG CTAATCAACA CAATTGGATC 180
GACTGTTCTA CTAACAACA GGAAAATGTG TATCTGGCAG CCTGTGGAGA AACACTAAAC 240
ATTGATTTTT CTTTGCCITT TACGGACTTT GTTCCAGCTA CATGTAATAC CAAGTTCTCT 300
TTAAGAGGAG AAGATGTTGA TCTTCATTG TTTCTACCAG ACTGCCACCC TAGTAAATAT 360
TCTTTATTTA TGCTGGTAAA AAATTGCCAT CCAAATAAGA TGATTCATGA TACTGGTATT 420
CCTGCTGAGT GTCAAGTGGC CAAGCGTCA 449

(2) INFORMATION FOR SEQ ID NO:193:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 372 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:193:

TGACGCTTGG CCACTTGACA CCAGGGATGT AKCAGTTGAA TATAATCCTG CAATTGTACA 60
TATTGGCAAT TTCCATCAA ACATTCTAGA AAGAGACAAC CAGGATTGCT AGGCCATAAA 120
AGCTGCAATA AATAACTGGT AATTGCAGTA ATCATTTCAG GCCAATTCAA TCCAGTTTGG 180
CTCAGAGGTG CCTTTGGCTG AGAGAAGAGG TGAGATATAA TGTGTTTTCT TGCAACTTCT 240
TGGAAGAATA ACTCCACAAT AGTCTGAGGA CTAGATACAA ACCTATTTGC CATTAAAGCA 300
CCAGAGTCTG TTAATTCCAG TACTGATAAG TGTGGGAGAT TAGACTCCAG TGTGTCAAGT 360
GGCCAAGCGT CA 372

(2) INFORMATION FOR SEQ ID NO:194:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 309 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:194:

```
TGACGCTTGG CCACTTGACA CTTATGTAGA ATCCATCGTG GGCTGATGCA AGCCCTTTAT    60
TTAGGCTTAG TGTGTGGGC ACCTTCAATA TCACACTAGA GACAAACGCC ACAAGATCTG    120
CAGAAACATT CAGTTCTGAN CACTCGAATG GCAGGATAAC TTTTGTGTT GTAATCCTTC    180
ACATATACAA AAACAACTC TGCANTCTCA CGTTACAAAA AAACGTA CTGTAAAATA    240
TTAAGAAGGG GTAAAGGATA CCATCTATAA CAAAGTAACT TACAACTAGT GTCAAGTGGC    300
CAAGCGTCA                                                                    309
```

(2) INFORMATION FOR SEQ ID NO:195:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 312 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:195:

```
TGACGCTTGG CCACTTGACA CCCAATCTCG CACTTCATCC TCCCAGCACC TGATGAAGTA    60
```

GGACTGCAAC TATCCCCACT TCCCAGATGA GGGGACCAAN GIACACATTA GGACCCGGAT 120
GGGAGCACAG ATTTGTCCGA TCCCAGACTC CAAGCACTCA GCGTCACTCC AGGACAGCGG 180
CTTTCAGATA AGGTCACAAA CATGAATGGC TCCGACAACC GGAGTCAGTC CGTGCTGAGT 240
TAAGGCAATG GTGACACGGA TGCACGTGTN ACCTGTAATG GTTCATCGTA AGTGTC AAGT 300
GGCCAAGCGT CA 312

(2) INFORMATION FOR SEQ ID NO:196:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 288 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:196:

TGTATCGACG TAGTGGTCTC CTCAGCCATG CAGAACTGTG ACTCAATTAA ACCTCTTTCC 60
TTTATGAATT ACCCAATCTC GGGTAGTGTC TTTATAGTAG TGTGAGAATG GACTAATACA 120
AGTACATTTT ACTTAGTAAT AATAATAAAC AAATATATTA CATTTTGTG TATTTACTAC 180
ACCATATTTT TTATTGTTAT TGTAGTGTAC ACCTTCTACT TATTAAGA AATAGGCCCG 240
AGGCGGGCAG ATCACGAGGT CAGGAGATGG AGACCACTAC GTCGATAC 288

(2) INFORMATION FOR SEQ ID NO:197:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 289 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:197:

```
TTGGGCACCT TCAATATCAT GACAGGTGAT GTGATAACCA AGAAGGCTAC TAAGTGATTA    60
ATGGGTGGGT AATGTATACA GAGTAGGTAC ACTGGACAGA GGGTAATTC ATAGCCAAGG    120
CAGGAGAAGC AGAATGGCAA AACATTTTCAT CACTACTC AGGATAGCAT GCAGTTTAAA    180
ACCTATAAGT AGTTTATTTT TGGAAATTTT CACTTAATAT TTTCAGACTG CAGGTAAC TA  240
AACTGTGGAA CACAAGAACA TAGATAAGGG GAGACCACTA CGTCGATAC                289
```

(2) INFORMATION FOR SEQ ID NO:198:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 288 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:198:

```
GTATCGACGT AGTGGTCTCC CAAGCAGTGG GAAGAAAACG TGAACCAATT AAAATGTATC    60
AGATACCCCA AAGAAAGGCG CTTGAGTAAA GATTCCAAGT GGGTCACAAT CTCAGATCTT    120
AAAATTCAGG CTGTCAAAGA GATTTGCTAT GAGGTTGCTC TCAATGACTT CAGGCACAGT    180
CGGCAGGAGA TTGAAGCCCT GGCCATTGTC AAGATGAAGG AGCTTTGTGC CATGTATGGC    240
```

AAGAAAGACC CCAATGAGCG GGACTCCTGG AGACCACTAC GTCGATAC

288

(2) INFORMATION FOR SEQ ID NO:199:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 1027 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:199:

GCTTTTGGG AAAACNCAA NTGGGGGAAA GGGGNTTNN TNGCAAGGGG ATAAAGGGGG	60
AANCCAGGG TTTCCCATI CAGGGAGGTG TAAAAAGNCG GCCAGGGGAT TGTAANAGGA	120
TTCAATAATA GGGGAATGG GCCNGAAGT TGCAAGGTTC CNGCCGCCA TGNC CGGGG	180
ATTTAGTGAC ATTACGACGS TGGTAATAAA GTGGGSCCAA WAAATATTG TGATGTGATT	240
TTTGACCAG TGAACCCATT GWACAGGACC TCATTTCTY TGAGATGRTA GCCATAATCA	300
GATAAAAGRT TAGAAGTYTT TCTGCACGTT AACAGCATCA TTAAATGGAG TGGCATCACC	360
AATTTACCC TTTGTTAGCC GATACCTTC CCTGAAGGC ATTCAATTAA GTGACCAATC	420
GTCATACGAG AGGGGATGGC ATGGGGATTG ATGATGATAT CAGGGGTGAT ACCTTCACAG	480
GTGAAAGGCA TATCCTCTTG TCTATACTGA ATACCACAAG TACCCTTTG ACCATGTCGA	540
CTAGCAAATT TGTCTCCAAT CTGTGTWATC CCTAACAGAG CGTACCCTTA TTTTACAAAA	600
TTTATATCCT TCCTGATTGA GAGTTACCAT AACCTGATCC ACAATGCCCC TCTCGCTWGT	660
TCTGAGAAAA GTGCTACAGT CTCTCTTGGT ATAGCGTCTA TTGGTGCTCT CCAATTCATC	720

TTCATTTTTC AGGCAAGGTG AACTGTTTTG CCTATAATAA CMTCATCTCC TGATACMCGA 780
AACCCKGGA RCTATCAAAC CATCATCATC CAGCGTTCKT WATGYMCTA AATCCCTATT 840
GCGGCCGCCT GCAGGTCAAC ATATNGGAAA ACCCCCCACC CCTTNGGAGC NTACCTTGAA 900
TTTTCCATAT GTCCNTAAA TTANCTNGNC TTANCCTGGC CNTAACCTNT TCCGGTTTAA 960
ATTGTTTCCG CCCCNTTCC CCNCCTTNA ACCGGAAACC TTAATTTTNA ACCNGGGGTT 1020
CCTATCC 1027

(2) INFORMATION FOR SEQ ID NO:200:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 207 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:200:

AGTGACATTA CGACGCTGGC CATCTTGAAT CCTAGGGCAT GAAGTTGCCC CAAAGTTCAG 60
CACTTGGTTA AGCCTGATCC CTCTGGTTTA TCACAAAGAA TAGGATGGGA TAAAGAAAGT 120
GGACACTTAA ATAAGCTATA AATTATATGG TCCTTGCTA GCAGGAGACA ACTGCACAGG 180
TATACTACCA GCGTCGTAAT GTCACTA 207

(2) INFORMATION FOR SEQ ID NO:201:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 209 base pairs

- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:201:

```
TGGGCACCTT CAATATCTAT TAAAAGCACA AATACTGAAG AACACACCAA GACTATCAAT    60
GAGGTTACAT CTGGAGTCCT CGATATATCA GGAAAAAATG AAGTGAACAT TCACAGAGTT    120
TTACTTCTTT GGGAACTCAA ATGCTAGAAA AGAAAAGGT GCCCTCTTTC TCTGGCTTCC    180
TGGTCCTATC CAGCGTCGTA ATGTCACTA                                     209
```

(2) INFORMATION FOR SEQ ID NO:202:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 349 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:202:

```
NTACGCTGCA ACACTGTGGA GCCACTGGTT TTTATTCCCG GCAGGTTATC CAGCAAACAG    60
TCACTGAACA CACCGAAGAC CGTGGTATGG TAACCGTTCA CAGTAATCGT TCCAGTCGTC    120
TGCGGGACCC CGACGAGCGT CACTGGGTAC AGACCAGATT CAGCCGGAAG AGAAAGCGCC    180
GCAGGGAGAG ACTCGAACTC CACTCCGCTG GTGAGCAGCC CCATGTTTTT AACTCGAAGT    240
TCAAACGGCA TTGGGTTATA TACCATCAGC TGAACCTCAC ACACATCTCC TTGAACCCAC    300
```

TGGAAATCTA TTTTCTTGTT CCGCTCTTCT CCACAGTGTT GCAGCGTAA 349

(2) INFORMATION FOR SEQ ID NO:203:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 241 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:203:

TGCTCCTCTT GCCTTACCAA CCCAAAGCCC ACTGTGAAAT ATGAAGTGAA TGACAAAATT 60
CAGTTTTCAA CGCAATATAG TATAGTTTAT CTGATTCTTT TGATCTCCAG GACACTTTAA 120
ACAACTGCTA CCACCACCAC CAACCTAGGG ATTTAGGATT CTCCACAGAC CAGAAATTAT 180
TTCTCCTTTG AGTTTCAGGC TCCTCTGGGA CTCCTGTTCA TCAATGGGTG GTAAATGGCT 240
A 241

(2) INFORMATION FOR SEQ ID NO:204:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 248 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:204:

TAGCCATTTA CCACCCATCT GCAAACCSWG ACMWWCARGR CYNGWACKYA GGCGATTGTA 60

AGTACTGGTA ATGCTCTGAT CATGTTAGTT ACATAAGTGT GGTCAGTTTA CAAAAATTCA 120
CAGAACTAAA TACTCAATGC TATGTGTTCA TGTCTGTGTT TATGTGTGTG TAATGTTTCA 180
ATTAAGTTTT TTTAAAAAAA AGAGATGATT TCCAAATAAG AAAGCCGTGT TGGTAAGGCA 240
AGAGGAGC 248

(2) INFORMATION FOR SEQ ID NO:205:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 505 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:205:

TACGCTGCAA CACTGTGGAG CCATTCATAC AGGTCCCTAA TTAAGGAACA AGTGATTATG 60
CTACCTTTGC ACGGTTAGGG TACCGCGGCC GTTAAACATG TGTCAGTGGG CAGGCGGTGC 120
CTCTAATACT GGTGATGCTA GAGGTGATGT TTTTGGTAAA CAGGCGGGGT AAGATTGGCC 180
GAGTTCCTTT TACTTTTTTT AACCTTTCCT TATGAGCATG CCTGTGTTGG GTTGACAGTG 240
GGGTAATAA TGAATTGTTG GTTGATTGTA GATATTGGGC TGTTAATTGT CAGTTCAGTG 300
TTTTAATCTG ACGCAGGCTT ATGCGGAGGA GAATGTTTTT ATGTTACTTA TACTAACATT 360
AGTTCCTCTA TAGGGTGATA GATTGGTCCA ATTGGGTGTG AGGAGTTCAG TTATATGTTT 420
GGGATTTTTT AGGTAGTGGG TGTGANCCTT GAACGCTTTC TTAATTGGTG GCTGCTTTTA 480
RGCCTACTAT GGGTGGTAAA TGGCT 505

(2) INFORMATION FOR SEQ ID NO:206:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 179 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:206:

```
TAGACTGACT CATGTCCCCT ACCAAAGCCC ATGTAAGGAG CTGAGTTCTT AAAGACTGAA      60
GACAGACTAT TCTCTGGAGA AAAATAAAAT GGAAATTGTA CTTTAAAAAA AAAAAAATC      120
GGCCGGGCAT GGTAGCACAC ACCTGTAATC CCAGCTACTA GGGGACATGA GTCAGTCTA      179
```

(2) INFORMATION FOR SEQ ID NO:207:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 176 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:207:

```
AGACTGACTC ATGTCCCCTA CCCACCTTC TGCTGTGCTG CCGTGTTCCT AACAGGTCAC      60
AGACTGGTAC TGGTCAGTGG CCTGGGGGTT GGGGACCTCT ATTATATGGG ATACAAATTT      120
AGGAGTTGGA ATTGACACGA TTTAGTGACT GATGGGATAT GGGTGGTAAA TGGCTA      176
```

(2) INFORMATION FOR SEQ ID NO:208:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 196 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:208:

```
AGACTGACTC ATGTCCCTA TTAAACAGGG TCTCTAGTGC TGTGAAAAA AAAAATGCTG    60
AACATTGCAT ATAATTATA TTGTAAGAAA TACTGTACAA TGACTTTATT GCATCTGGGT    120
AGCTGTAAGG CATGAAGGAT GCCAAGAAGT TTAAGGAATA TGGGTGGTAA ATGGCTAGGG    180
GACATGAGTC AGTCTA                                     196
```

(2) INFORMATION FOR SEQ ID NO:209:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 345 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:209:

```
GACGCTTGGC CACTTGACAC CTTTTATTTT TTAAGGATTC TTAAGTCATT TANGTNACTT    60
TGTAAGTTTT TCCTGTGCCC CCATAAGAAT GATAGCTTTA AAAATTATGC TGGGGTAGCA    120
AAGAAGATAC TTCTAGCTTT AGAATGTGTA GGTATAGCCA GGATTCTTGT GAGGAGGGGT    180
GATTTAGAGC AAATTCTTA TTCTCCTTGC CTCATCTGTA ACATGGGGAT AATAATAGAA    240
```

CTGGCTTGAC AAGGTTGGAA TTAGTATTAC ATGGTAAATA CATGTAAAT GTTTAGAATG 300

GTGCCAAGTA TCTAGGAAGT ACTTGGGCAT GGGTGGTAAA TGGCT 345

(2) INFORMATION FOR SEQ ID NO:210:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 178 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:210:

GACGCTTGGC CACTTGACAC TAGAGTAGGG TTTGGCCAAC TTTTCTATA AAGGACCAGA 60

GAGTAAATAT TTCAGGCTTT GTGGGTTGTG CAGTCTCTCT TGCAACTACT CAGCTCTGCC 120

ATTGTAGCAT AGAAATCAGC CATAGACAGG ACAGAAATGA ATGGGTGGTA AATGGCTA 178

(2) INFORMATION FOR SEQ ID NO:211:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 454 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:211:

TGGGCACCTT CAATATCTAT CCAGCGCATC TAAATTCGCT TTTTCTTGA TIAAAAATTT 60

CACCACTTGC TGTTTTTGTG CATGTATACC AAGTAGCAGT GGTGTGAGGC CATGCTTGTT 120

TTTGATTG ATATCAGCAC CGTATAAGAG CAGTGCTTTG GCCATTAATT TATCTTCATT 180
GTAGACAGCA TAGTGTAGAG TGGTATCTCC ATACTCATCT GGAATATTTG GATCAGTGCC 240
ATGTTCCAGC AACATTAAAG CACATTCATC TTCCTGGCAT TGTACGGCCI TTGTCAGAGC 300
TGTCTCTTT TTGTGTCAA GGACATTAAG TTGACATCGT CTGTCCAGCA CGAGTTTAC 360
TACTTCTGAA TTCCATTGG CAGAGGCCAG ATGTAGAGCA GTCCTCTTTT GCTTGTCCCT 420
CTTGTCACA TCAGTGTCCC TGAGCATAAC GGAA 454

(2) INFORMATION FOR SEQ ID NO:212:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 337 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:212:

TCCGTTATGC CACCCAGAAA ACCTACTGGA GTTACTTATT AACATCAAGG CTGGAACCTA 60
TTTGCCTCAG TCCTATCTGA TTCATGAGCA CATGGTTATT ACTGATCGCA TTGAAAACAT 120
TGATCACCTG GGTTTCTTTA TTTATCGACT GTGTCATGAC AAGGAACTT ACAAACCTGCA 180
ACGCAGAGAA ACTATTAAAG GTATTCAGAA ACGTGAAGCC AGCAATTGTT TCGCAATTCC 240
GCATTTTGAA AACAAATTTG CCGTGGAAAC TTTAATTTGT TCTTGAACAG TCAAGAAAAA 300
CATTATTGAG GAAAATTAAT ATCAGAGCAT AACGGAA 337

(2) INFORMATION FOR SEQ ID NO:213:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 715 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(x1) SEQUENCE DESCRIPTION: SEQ ID NO:213:

```
TCGGGTGATG CCTCCTCAGG CATCTTCCAT CCATCTCTTC AAGATTAGCT GTCCCAAATG      60
TTTTTCCTTC TCTTCTTTAC TGATAAATTT GGA CTCCTTC TTGACACTGA TGACAGCTTT      120
AGTATCCTTC TTGTCACCTT GCAGACTTTA AACATAAAAA TACTCATTGG TTTTAAAAGG      180
AAAAAAGTAT ACATTAGCAC TATTAAGCTT GGCCTTGAAA CATTTTCTAT CTTTATTAA      240
ATGTCGGTTA GCTGAACAGA ATTCATTTTA CAATGCAGAG TGAGAAAAGA AGGGAGCTAT      300
ATGCATTTGA GAATGCAAGC ATTGTCAAAT AAACATTTTA AATGCTTTCT TAAAGTGAGC      360
ACATACAGAA ATACATTAAG ATATTAGAAA GTGTTTTTGC TTGTGTA CTAATTAGGG      420
AAGCACCTTG TATAGTTCCT CTCTCTAAAAT TGAAGTAGAT TTTAAAAACC CATGTAATTT      480
AATTGAGCTC TCAGTTCAGA TTTTAGGAGA ATTTTAACAG GGATTTGGTT TTGTCTAAAT      540
TTTGTC AATT TTTTAGTGA ATCTGTATAA TTTTATAAAT GTCAAAGTGT ATTTAGTCCG      600
TTTTCATGCT GCTATGAAAG AAATACCCAN GACAGGGTTA TTTATAAANG GAAAGANGTT      660
AATTTGACTC CCAGTTCACA GGCCTGAGGA NGNATCNC CCG GAAATCCTTA TTGCG      715
```

(2) INFORMATION FOR SEQ ID NO:214:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 345 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:214:

```
GGTAANGNGC ATACNTCGGT GCTCCGGCCG CCGGAGTCGG GGGATTGGG TGATGCCTCC    60
TCAGGCCAC TTGGGCCTGC TTTTCCAAA TGGCAGCTCC TCTGGACATG CCAITCCTTC    120
TCCACCTGC CTGATTCTTC ATATGTTGGG TGTCCCTGTT TTTCTGGTGC TATTCTCTGA    180
CTGCTGTTCA GCTGCCACTG TCCTGCAAAG CCTGCCTTTT TAAATGCCTC ACCATTCCTT    240
CATTTGTTTC TTAAATATGG GAAGTAAAAG TGCCACCTGA GGCCGGGCAC AGTGGCTCAC    300
GCCTGTAATC CCAGCACTTT GGGAGCCTGA GGAGGCATCA CCCGA                      345
```

(2) INFORMATION FOR SEQ ID NO:215:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 429 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:215:

```
GGTGATGCCT CCTCAGGCGA AGCTCAGGGA GGACAGAAAC CTCCCGTGA GCAGAAGGGC    60
AAAAGCTCGC TTGATCTTGA TTTTCAGTAC GAATACAGAC CGTGAAAGCG GGGCCTCACG    120
```

ATCCTTCTGA CCTTTTGGGT TTTAAGCAGG AGGTGTCAGA AAAGTTACCA CAGGGATAAC 180
TGGCTTGTGG CGGCCAAGCG TTCATAGCGA CGTCGCTTTT TGATCCTTCG ATGTCGGCTC 240
TTCCTATCAT TGTGAAGCAG AATTCACCAA GCGTTGGATT GTTACCCAC TAATAGGGAA 300
CGTGAGCTGG GTTTAGACCG TCGTGAGACA GGTTAGTTTT ACCCTACTGA TGATGTGK 360
TTGCCATGGT AATCCTGCTC AGTACGAGAG GAACCGCAGG TTCASACATT TGGTGTATGT 420
GCTTGCCTT 429

(2) INFORMATION FOR SEQ ID NO:216:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 593 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:216:

TGACACCTAT GTCCNGCATC TGTTACAGT TTCCACAAAT AGCCAGCCTT TGGCCACCTC 60
TCTGTCTGA GGTATACAAG TATATCAGGA GGTGTATACC TTCTTTCTC TTCCCACCA 120
AAGAGAACA1 GCAGGCTCTG GAAGCTGTCT TAGGAGCCTT TGGGCTCAGA ATTCAGAGT 180
CTTGGGTACC TTGGATGTGG TCTGGAAGGA GAAACATTGG CTCTGGATAA GGAGTACAGC 240
CGGAGGAGGG TCACAGAGCC CTCAGCTCAA GCCCCTGTGC CTTAGTCTAA AAGCAGCTTT 300
GGATGAGGAA GCAGGTTAAG TAACATACGT AAGCGTACAC AGGTAGAAAG TGCTGGGAGT 360

180

CAGAATTGCA CAGTGTGTAG GAGTAGIACC TCAATCAATG AGGGCAAATC AACTGAAAGA 420
AGAAGACCNA TTAATGAATT GCTTANGGGG AAGGATCAAG GCTATCATGG AGATCTTCT 480
AGGAAGATT A TTGTTTANAA TTATGAAAGG ANTAGGGCAG GGACAGGGCC AGAAGTANAA 540
GANAACATTG CCTATANCCC TTGTCTTGCA CCCAGATGCT GGACAAGGTG TCA 593

(2) INFORMATION FOR SEQ ID NO:217:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 335 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:217:

TGACACCTTG TCCAGCATCT GACGTGAAGA TGAGCAGCTC AGAGGAGGTG TCCTGGATT 60
CCTGGTTCTG TGGGCTCCGT GGCAATGAAT TCTTCTGTGA AGTGGATGAA GACTACATCC 120
AGGACAAATT TAATCTIACT GGACTCAATG AGCAGGTCCC TCACTATCGA CAAGCTCTAG 180
ACATGATCTT GGACCTGGAG CCTGATGAAG AACTGGAAGA CAACCCCAAC CAGAGTGACC 240
TGATTGAGCA GGCAGCCGAG ATGCTTTATG GATTGATCCA CGCCCGCTAC ATCCTTACCA 300
ACCGTGGCAT CGCCAGATG CTGGACAAGG TGTCA 335

(2) INFORMATION FOR SEQ ID NO:218:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 248 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:218:

TACGTACTGG TCTTGAAGGT CTTAGGTAGA GAAAAATGT GAATATTTAA TCAAAGACTA	60
TGTATGAAAT GGGACTGTAA GTACAGAGGG AAGGGTGGCC CTTATCGCCA GAAGTTGGTA	120
GATGCGTCCC CGTCATGAAA TGTGTGTCA CTGCCCACCA TTGCCGAAT TACTGAAAT	180
CCGTAGAATT AGTGCAAATT CTAACGTTGT TCATCTAAGA TTATGGTTCC ATGTTTCTAG	240
TACTTTTA	248

(2) INFORMATION FOR SEQ ID NO:219:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 530 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:219:

TGACGCTTGG CCACTTGACA CAAGTAGGGG ATAAGGACAA AGACCCATNA GGTGGCCTGT	60
CAGCCTTTTG TTA CTGTTGC TTCCCTGTCA CCACGGCCCC CTCTGTAGGG GTGTGCTGTG	120
CTCTGTGGAC ATTGGTGCA TTTACACAT ACCATTCTCT TTCTGCTTCA CAGCAGTCCT	180
GAGGCCGGGAG CACACAGGAC TACCTTGTC GATGAGATA ATGATGTCTG GCCAACTCAC	240
CCCCAACCT TCTCACTAGT TATANGAAGA GCCANGCCTA NAACCTTCTA TCCTGNCCCC	300

TTGCCCTATG ACCTCATCCC TGTTCATGC CCTATTCTGA TTTCTGGTGA ACTTTGGAGC 360
AGCCTGGTTT NTCCTCCTCA CTCCAGCCTC TCTCCATACC ATGGTANGGG GGTGCTGTTC 420
CACNCAAANG GTCAGGTGTG TCTGGGGAAT CCTNANANCT GCCNGGAGTT TCCNANGCAT 480
TCTTAAAAAC CTTCTTGCCT AATCANATNG TGTCCAGTGG CCAACCNCTN 530

(2) INFORMATION FOR SEQ ID NO:220:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 531 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:220:

TGACGCTTGG CCACTTGACA CTAATAGCA TCTTCTAAAG GCCTGATTCA GAGTTGTGGA 60
AAATTCTCCC AGTGTCAAGG ATTGTCAGGA ACAGGGCTGC TCCTGTGCTC ACTTTACCTG 120
CTGTGTTTCT GCTGAAAAG GAGGGAAGAG GAATGGCTGA TTTTACCTA ATGTCTCCCA 180
GTTTTTCATA TTCTTCTGG ATCCTCTTCT CTGACAACTG TTCCCTTTTG GTCTTCTTCT 240
TCTTGCTCAG AGAGCAGGTC TCTTTAAAC TGAGAAGGGA GAATGAGCAA ATGATTAAG 300
AAAACACACT TCTGAGGCC AGAGATCAAA TATTAGGTAA ATACTAAACC GCTTGCCTGC 360
TGTGGTCACT TTTCTCTCT TTCACATGCT CTATCCCTCT ATCCCCACC TATTCATATG 420
GCTTTTATCT GCCAAGTTAT CCGGCTCTC ATCAACCTTC TCCCCTAGCC TACTGGGGGA 480

TATCCATCTG GGTCTGTCTC TGGTGTATTG GTGTCAAGTG GCCAAGCGTC A 531

(2) INFORMATION FOR SEQ ID NO:221:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 530 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:221:

ATTGACGCTT GGCCACTTGA CACCCGCCTG CCTGCAATAC TGGGGCAAGG GCCTTCACTG 60
CTTTCCTGCC ACCAGCTGCC ACTGCACACA GAGATCAGAA ATGCTACCAA CCAAGACTGT 120
TGGTCCTCAG CCTCTCTGAG GAGAAAGAGC AGAAGCCTGG AAGTCAGAAG AGAAGCTAGA 180
TCGGCTACGG CCTTGGCAGC CAGCTTCCCC ACCTGTGGCA ATAAAGTCGT GCATGGCTTA 240
ACAATGGGGG CACCTCCTGA GAAACACATT GTTAGGCAAT TCGGCGTGTG TTCATCAGAG 300
CATATTTACA CAAACCTCGA TAGTGCAGCC TACTATCCAC TATTGCTCCT ACGCTGCAAA 360
CCTGAACAGC ATGGGACTGT ACTGAATACT GGAAGCAGCT GGTGATGGTA CTTATTTGTG 420
TATCTAAACA CAGAGAAGGT ACAGTAAGAA TATGGTATCA TAACTTACA GGGACCGCCA 480
TCCTATATGC AGTCTGTTGT GACCAAAATG TGTCAAGTGG CCAAGCGTCA 530

(2) INFORMATION FOR SEQ ID NO:222:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 578 base pairs
- (B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:222:

TGTATCGACG TAGTGGTCTC CGGGCTACTA GGCCGTTGTG TGCTGGTAGT ACCTGGTTCA	60
CTGAAAGGCG CATCTCCCTC CCCGCGTCGC CCTGAAGCAG GGGGAGGACT TCGCCAGCC	120
AAGGCAGTTG TATGAGTTT AGCTGCGGCA CTTGAGACC TCTGAGCCA CCTCCTCAG	180
GAGCCTTCCC CGATTAAGGA AGCCAGGTA AGGATTCCTT CCTCCCCAG ACACCAGAA	240
CAAACCACCA CCCCCCTAT TCTGCGAGCC CATATACATC AGAACGAAAC AAAAATAACA	300
AATAAACNAA AACCAAAAA AAAAGAGAAG GGGAAATGTA TATGTCTGTC CATCCTGTTG	360
CTTTAGCCTG TCAGCTCCTA NAGGGCAGGG ACCGTGTCTT CCGAATGGTC TGTGCAGCGC	420
CGACTGCGGG AAGTATCGGA GGAGGAAGCA GAGTCAGCAG AAGTTGAACG GTGGGCCCGG	480
CGGCTCTTGG GGGCTGGTGT TGTA CTTCGA GACCGCTTTC GCTTTTGTG TTAGATTAC	540
GTTTGCTCTT TGGAGTGGGA NACCACTACN TCNATACA	578

(2) INFORMATION FOR SEQ ID NO:223:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 578 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:223:

TGTATCGACG TAGTGGTCTC CTCTTGCAAA GGACTGGCTG GTGAATGGTT TCCCTGAATT	60
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ATGGACTTAC CCTAAACATA TCTTATCATC ATTACCAAGT GCAAAATATT AGAATGTGTT 120
GTCAGTGTTC CATTTGATTC CTAGAAGGTT AGTCTTAGAT ATGTTACTTT AACCTGTATG 180
CTGTAGTGCT TTGAATGCAT TTTTGTGTTG CATTTTGTG TGCCCAACCT GTCAATTATA 240
GCTGCTTAGG TCTGGACTGT CCTGGATAAA GCTGTAAAA TATTCACCAG TCCAGCCATC 300
TTACAAGCTA ATTAAGTCAA CTAATGCTT CCTTGTTTTG CCAGACTTGT TATGTCAATC 360
CTCAATTCT GGGTTCATTT TGGTGCCCT AAATCTTAGG GTGTGACTTT CTTAGCATCC 420
TGTAACATCC ATTCCAAGC AAGCACAAC TCACATAATA CTTCCAGAA GTTCATTGCT 480
GAAGCCTTTC CTTACCCAG CGGAGCAACT TGATTTTCTA CAACTTCCCT CATCAGAGCC 540
ACAAGAGTAT GGGATATGGA GACCACTACG TCGATACA 578

(2) INFORMATION FOR SEQ ID NO:224:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 345 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:224:

TGTATCGACG TANTGGTCTC CCAAGGTGCT GGGATTGCAG GCATGAGCCA CCACTCCCAG 60
GTGGATCTTT TTCTTTATAC TTAATTGATT AGGTTTCTGT TATTCAAGAA GTGTAGTGGT 120
AAAAGTCTTT TCAATCTACA TGGTTAAATA ATGATAGCCT GGGAAATAAA TAGAAATTTT 180
TTCTTTCATC TTTAGGTGTA ATAAAGAAAC AGAAAAATA GAACATACTG AAAATAATCT 240

AAGTTCCAAC CATAGAAGAA CTGCAGAAGA AATGAAGAAA GTGATGATGA TTTAGATTI 300

GATATTGATT TAGAAGACAC AGGAGGAGAC CACTACGTCG ATACA 345

(2) INFORMATION FOR SEQ ID NO:225:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 347 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:225:

TGTATCGACG TAGTGGTCTC CAACTGAGG TATGTGTGCC ACTAGCACAC AAAGCCTTCC 60

AACAGGGACG CAGGCACAGG CAGTTTAAAG GGAATCTGTT TCTAAATTAA TTTCCACCTT 120

CTCTAAGTAT TCTTTCCTAA AACTGATCAA GGTGTGAAGC CTGTGCTCTT TCCCAACTCC 180

CCTTTGACAA CAGCCTTCAA CTAACACAAG AAAAGGCATG TCTGACACTC TTCCTGAGTC 240

TGACTCTGAT ACGTTGTTCT GATGTCTAAA GAGCTCCAGA ACACCAAAGG GACAATTCAG 300

AATGCTGGTG TATAACAGAC TCCAATGGAG ACCACTACGT CGATACA 347

(2) INFORMATION FOR SEQ ID NO:226:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 281 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:226:

AGGNGNGGGA NTGTATCGAC GTAGTGGTCT CCCAACAGTC TGTCATTAG TCTGCAGGTG 60
TCAGTGTITT GGACAATGAG GCACCATGT CACTTATTGA CTCCTCAGCT CTAAATGCTG 120
AAATTAAATC TTGTCATGAC AAGTCTGGA TTCTGATGA GGTTTACAA AGTATTTTGG 180
ATCAATACTC CAACAAATCA GAAAGCCAGA AAGAGGATCC TTTCAATATT GCAGAACCAC 240
GAGTGGATTT ACACACCTCA GGAGACCACT ACGTCGATAC A 281

(2) INFORMATION FOR SEQ ID NO:227:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 3646 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:227:

GGGAAACACT TCCTCCAGC CTTGTAAGG TTGGAGCCCT CTCCAGTATA TGCTGCAGAA 60
TTTTTCTCTC GGTTCCTCAG AGGATTATGG AGTCCGCCTT AAAAAAGGCA AGCTCTGGAC 120
ACTCTGCAAA GTAGAATGGC CAAAGTTTGG AGTTGAGTGG CCCCTTGAAG GGTCAGTGAA 180
CCTCACAATT GTTCAAGCTG TGTGGCGGGT TGTTACTGAA ACTCCCGGCC TCCCTGATCA 240
GTTTCCTAC ATTGATCAAT GGCTGAGTTT GGTCAGGAGC ACCCCTTCGG TGGCTCCACT 300
CATGCACCAT TCATAATTTT ACCTCCAAGG TCCTCCTGAG CCAGACCGTG TTTTCGCCTC 360
GACCCTCAGC CGGTTGGCT CGCCCTGTAC TGCCTCTCTC TGAAGAAGAG GAGAGTCTCC 420
CTCACCAGT CCCACCGCCT TAAACCAGC CTACTCCCTT AGGGTCATCC CATGTCTCCT 480

CGGCTATGTC CCCTGTAGGC TCATCACCCA TTGCCTCTTG GTTGCAACCG TGGTGGGAGG 540

AAGTAGCCCC TCTACTACCA CTGAGAGAGG CACAAGTCCC TCTGGGTGAT GAGTGCTCCA 600

CCCCCTTCCT GGTTCATGTC CCTTCTTCT ACTTCTGACT TGTATAATTG GAAAACCCAT 660

AATCCTCCCT TCTCTGAAAA GCCCAGGCT TTGACCTCAC TGATGGAGTC TGTACTCTGG 720

ACACATTGGC CCACCTGGGA TGACTGTCAA CAGCTCCTTT TGACCCTTTT CACCTCTGAA 780

GAGAGGGAAA GATCCAAAG AGAGGCCAA AAGTACAACC TCACATCAAC CAATAGGCCG 840

GAGGAGGAAG CTAGAGGAAT AGTGATTAGA GACCCAATTG GGACCTAATT GGGACCCAAA 900

TTTCTCAAGT GGAGGGAGAA CTTTGACGA TTTCACCGG TATCTCCTCG TGGGTATTCA 960

GGGAGCTGCT CAGAAACCTA TAACTTGTC TAAGGCGACT GAAGTCGTCC AGGGGCATGA 1020

TGAGTCACCA GGAGTGTTTT TAGAGCACCT CCAGGAGGCT TATCAGATTT ACACCCCTTT 1080

TGACCTGGCA GCCCCGAAA ATAGCCATGC TCTTAATTG GCATTTGTGG CTCAGGCAGC 1140

CCCAGATAGT AAAAGGAAAC TCCAAAACT AGAGGGATTG TGCTGGAATG AATACCAGTC 1200

AGCTTTTAGA GATAGCCTAA AAGGTTTTG ACAGTCAAGA GGTGAAAAA CAAAAACAAG 1260

CAGCTCAGGC AGCTGAAAA AGCCACTGAT AAAGCATCCT GGAGTATCAG AGTTTACTGT 1320

TAGATCAGCC TCATTTGACT TCCCTCCCA CATGGTGTTT AAATCCAGCT AACTACTTC 1380

CTGACTCAA CTCCACTATT CCTGTTGATG ACTGTCAGGA ACTGTTGAA ACTACTGAAA 1440

CTGGCCGACC TGATCTTCAA AATGTGCCCC TAGGAAAGGT GGATGCCACC ATGTTACAG 1500

ACAGTAGCAG CTTCTCGAG AAGGGACTAC GAAAGGCCGG TGCAGCTGTT ACCATGGAGA 1560

CAGATGTGTT GTGGGCTCAG GCTTTACCAG CAAACACCTC AGCACAAAAG GCTGAATTGA 1620

TCGCCCTCAC TCAGGCTCTC CGATGGGGTA AGGATATTAA CGTTAACT GACAGCAGGT 1680

ACGCCCTTGC TACTGTGCAT GTACGTGGAG CCATCTACCA GGAGCGTGGG CTA CTACCT 1740

CAGCAGGTGG CTGTAATCCA CTGTAAAGGA CATCAAAGG AAAACACGGC TGTGCCCCGT 1800

GGTAACCAGA AAGCTGATTC AGCAGCTCAA GATGCAGTGT GACTTTCAGT CAGCCTCTA 1860

AACTTGCTGC CCACAGTCTC CTTTCCACAG CCAGATCTGC CTGACAATCC CGCATACTCA 1920

ACAGAAGAAG AAAACTGGCC TCAGAACTCA GAGCCAATAA AAATCAGGAA GGTGGTGGA 1980

TTCTTCCTGA CTCTAGAATC TTCATACCCC GAACTCTTGG GAAAACCTTA ATCAGTCACC 2040

TACAGTCTAC CACCCATTTA GGAGGAGCAA AGCTACCTCA GCTCCTCCGG AGCCGTTTTA 2100

AGATCCCCCA TCTCAAAGC CTAACAGATC AAGCAGCTCT CCGGTGCACA ACCTGCGCCC 2160

AGGTAAATGC CAAAAAGGT CCTAAACCCA GCCCAGGCCA CCGTCTCCAA GAAAACCTAC 2220

CAGGAGAAAA GTGGGAAATT GACTTTACAG AAGTAAACC ACACCGGGCT GGTACAAA 2280

ACCTTCTAGT ACTGGTAGAC ACCTTCTCTG GATGGACTGA AGCATTTGCT ACCAAAAACG 2340

AAACTGTCAA TATGGTAGTT AAGTTTTTAC TCAATGAAAT CATCCCTCGA CATGGGCTGC 2400

CTGTTTGCCA TAGGGTCTGA TAATGGACCG GCCTTCGCCT TGTCTATAGT TTAGTCAGTC 2460

AGTAAGGCGT TAAACATTCA ATGGAAGCTC CATTGTGCCT ATCGACCCCA GAGCTCTGGG 2520

CAAGTAGAAC GCATGAACTG CACCCTAAAA AACACTCTTA CAAAATTAAT CTTAGAAACC 2580

GGTGTAATT GTGTAAGTCT CCTTCCTTTA GCCCTACTTA GAGTAAGGTG CACCCCTTAC 2640

TGGGCTGGGT TCTTACCTTT TGAAATCATG TATGGGAGGG TGCTGCCTAT CTTGCCTAAG 2700
CTAAGAGATG CCCAATTGGC AAAAATATCA CAACTAATT TATTACAGTA CCTACAGTCT 2760
CCCCAACAGG TACAAGATAT CATCCTGCCA CTTGTTGAG GAACCCATCC CAATCCAATT 2820
CCTGAACAGA CAGGGCCCTG CCATTCATTC CCGCCAGGTG ACCTGTTGTT TGTAAAAAG 2880
TTCCAGAGAG AAGGACTCCC TCCTGCTTGG AAGAGACCTC ACACCGTCAT CACGATGCCA 2940
ACGGCTCTGA AGGTGGATGG CATTCTGCG TGGATTCATC ACTCCCGCAT CAAAAAGGCC 3000
AACAGAGCCC AACTAGAAAC ATGGGTCCCC AGGGCTGGGT CAGGCCCTT AAAACTGCAC 3060
CTAAGTTGGG TGAAGCCATT AGATTAATTC TTTTCTTAA TTTTGTA AAA CAATGCATAG 3120
CTTCTGTCAA ACTTATGTAT CTTAAGACTC AATATAACCC CCTTGTTATA ACTGAGGAAT 3180
CAATGATTTG ATTCCCCAA AAACACAAGT GGGGAATGTA GTGTCCAACC TGGTTTTTAC 3240
TAACCCTGTT TTTAGACTCT CCCTTCTCT TAATCACTCA GCTTGTTTCC ACCTGAATTG 3300
ACTCTCCCTT AGCTAAGAGC GCCAGATGGA CTCCATCTTG GCTCTTTCAC TGGCAGCCGC 3360
TTCTCAAGG ACTTAAGTGA TGCAAGCTGA CTCCCAGCAC ATCCAAGAAT GCAATTAAT 3420
GATAAGATAC TGTGGCAAGC TATATCCGCA GTTCCCAGGA ATTCGTCCAA TTGATCACAG 3480
CCCCCTACC CTTAGCAAC CACCACCCTG ATCAGTCAGC AGCCATCAGC ACCGAGGCAA 3540
GGCCCTCCAC CAGCAAAAAG ATTCTGACTC ACTGAAGACT TGGATGATCA TTAGTATTTT 3600
TAGCAGTAAA GTTTTTTTTT CTTTTCTTT CTTTTTTCT CGTGCC 3646

Claims

1. An isolated DNA molecule, comprising:
 - (a) a nucleotide sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227;
 - (b) a variant of said nucleotide sequence that contains one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions, such that the antigenic and/or immunogenic properties of the polypeptide encoded by the nucleotide sequence are retained; or
 - (c) a nucleotide sequence encoding an epitope of a polypeptide encoded by at least one sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227.
2. An isolated DNA molecule encoding an epitope of a polypeptide, wherein said polypeptide is encoded by a nucleotide sequence that:
 - (a) hybridizes to a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227 under stringent conditions; and
 - (b) is at least 80% identical to a sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227;and wherein RNA corresponding to said nucleotide sequence is expressed at a greater level in human breast tumor tissue than in normal breast tissue.
3. An isolated DNA molecule encoding an epitope of a polypeptide, wherein said polypeptide is encoded by:

(a) a nucleotide sequence transcribed from the sequence of SEQ ID NO: 141; or

(b) a variant of said nucleotide sequence that contains one or more nucleotide substitutions, deletions, insertions and/or modifications at no more than 20% of the nucleotide positions, such that the antigenic and/or immunogenic properties of the polypeptide encoded by the nucleotide sequence are retained.

4. An isolated DNA or RNA molecule comprising a nucleotide sequence complementary to a DNA molecule according to any one of claims 1-3.

5. A recombinant expression vector comprising a DNA molecule according to any one of claims 1-3.

6. A host cell transformed or transfected with an expression vector according to claim 5.

7. A polypeptide comprising an amino acid sequence encoded by a DNA molecule according to any one of claims 1-3.

8. A polypeptide according to claim 7 wherein said polypeptide comprises an epitope of an amino acid sequence encoded by at least one nucleotide sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227.

9. A monoclonal antibody that binds to a polypeptide according to claim 7.

10. A method for determining the presence of breast cancer in a patient comprising detecting, within a biological sample, at least one polypeptide according to claim 7, and therefrom determining the presence of breast cancer in the patient.

11. A method for determining the presence of breast cancer in a patient comprising detecting within a biological sample, at least one polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

12. The method of claims 10 or 11 wherein the biological sample is a portion of a breast tumor.

13. The method of claim 10 wherein the step of detecting comprises contacting the biological sample with a monoclonal antibody according to claim 9.

14. The method of claim 11 wherein the step of detecting comprises contacting the biological sample with a monoclonal antibody that binds to a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

15. A method for determining the presence of breast cancer in a patient comprising detecting, within a biological sample, an RNA molecule encoding at least one polypeptide according to claim 7, and therefrom determining the presence of breast cancer in the patient.

16. A method for determining the presence of breast cancer in a patient comprising detecting, within a biological sample, at least one RNA molecule encoding a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID

NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions; and therefrom determining the presence of breast cancer in the patient.

17. The method of claims 15 or 16 wherein the biological sample is a portion of a breast tumor.

18. The method of claim 15 wherein the step of detecting comprises:

(a) preparing cDNA from RNA molecules within the biological sample;
and

(b) specifically amplifying cDNA molecules that are capable of encoding at least a portion of a polypeptide according to claim 7, and therefrom determining the presence of breast cancer in the patient.

19. The method of claim 16 wherein the step of detecting comprises:

(a) preparing cDNA from RNA molecules within the biological sample;
and

(b) specifically amplifying cDNA molecules that are capable of encoding at least a portion of a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions; and therefrom determining the presence of breast cancer in the patient.

20. A polypeptide according to claim 7 for use within a method for detecting the presence of breast cancer in a patient.

21. A polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions, for use within a method for detecting the presence of breast cancer in a patient.

22. A method for monitoring the progression of breast cancer in a patient, comprising:

- (a) detecting an amount, in a biological sample, of at least one polypeptide according to claim 7 at a first point in time;
- (b) repeating step (a) at a subsequent point in time; and
- (c) comparing the amounts of polypeptide detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient.

23. A method for monitoring the progression of breast cancer in a patient, comprising:

- (a) detecting in a biological sample an amount of at least one polypeptide at a first point in time, the polypeptide being encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions;
- (b) repeating step (a) at a subsequent point in time; and
- (c) comparing the amounts of polypeptide detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient.

24. The method of claims 22 or 23 wherein the biological sample is a portion of a breast tumor.

25. The method of claim 22 wherein the step of detecting comprises contacting a portion of the biological sample with a monoclonal antibody according to claim 9.

26. The method of claim 23 wherein the step of detecting comprises contacting the biological sample with a monoclonal antibody that binds to a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86

and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

27. The method of either of claims 20 or 22 wherein said polypeptide comprises an epitope of an amino acid sequence encoded by at least one nucleotide sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3 - SEQ ID NO:77 and SEQ ID NOS:142, 143, 146-152, 154-166, 168-176, 178-192, 194-198, 200-204, 206, 207, 209-214, 216, 218, 219, 221-227.

28. A method for monitoring the progression of breast cancer in a patient, comprising:

- (a) detecting an amount, within a biological sample, of at least one RNA molecule encoding a polypeptide according to claim 7 at a first point in time;
- (b) repeating step (a) at a subsequent point in time; and
- (c) comparing the amounts of RNA molecules detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient.

29. The method of claim 28 wherein the step of detecting comprises:

- (a) preparing cDNA from RNA molecules within the biological sample; and
- (b) specifically amplifying cDNA molecules that are capable of encoding at least a portion of a polypeptide according to claim 7.

30. A method for monitoring the progression of breast cancer in a patient, comprising:

- (a) detecting an amount, within a biological sample, of at least one RNA molecule at a first point in time, the RNA molecule encoding a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions;

- (b) repeating step (a) at a subsequent point in time; and
- (c) comparing the amounts of RNA molecules detected in steps (a) and (b), and therefrom monitoring the progression of breast cancer in the patient.

31. A pharmaceutical composition, comprising a polypeptide according to claim 7 and a physiologically acceptable carrier.

32. A pharmaceutical composition for inhibiting the development of breast cancer, comprising a polypeptide and a physiologically acceptable carrier, the polypeptide being encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

33. A vaccine, comprising a polypeptide according to claim 7 and an immune response enhancer.

34. A vaccine, comprising a DNA molecule according to any one of claims 1-3.

35. A vaccine, comprising a recombinant expression vector comprising a DNA molecule according to any one of claims 1-3.

36. A vaccine for inhibiting the development of breast cancer, comprising a polypeptide and an immune response enhancer, the polypeptide being encoded by a nucleotide sequence selected from the group consisting of SEQ ID NO: 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220, and sequences that hybridize thereto under stringent conditions.

37. A diagnostic kit comprising:

- (a) one or more monoclonal antibodies according to claim 9; and

(b) a detection reagent.

38. A diagnostic kit comprising:

(a) one or more monoclonal antibodies that bind to a polypeptide encoded by a nucleotide sequence selected from the group consisting of sequences provided in SEQ ID 78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220; and

(b) a detection reagent.

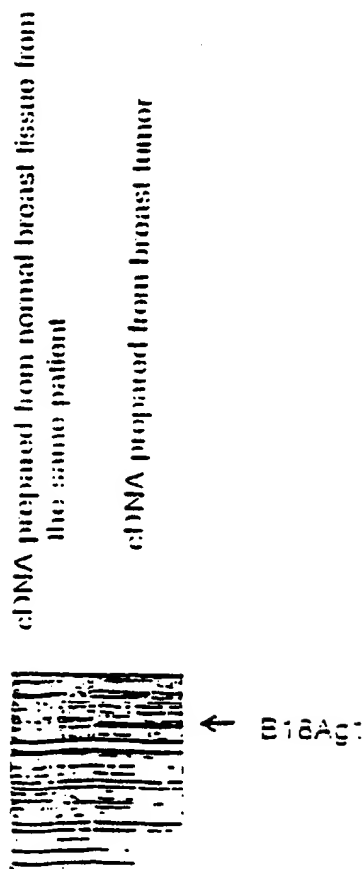
39. The kit of any one of claims 37 or 38 wherein the monoclonal antibody(s) are immobilized on a solid support.

40. A diagnostic kit comprising a first polymerase chain reaction primer and a second polymerase chain reaction primer, the first and second primers each comprising at least about 10 contiguous nucleotides of an RNA molecule according to claim 4.

41. A diagnostic kit comprising a first polymerase chain reaction primer and a second polymerase chain reaction primer, the first and second primers each comprising at least about 10 contiguous nucleotides of an RNA molecule encoding a polypeptide encoded by a nucleotide sequence selected from the group consisting of SEQ ID NOS:78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220.

42. A diagnostic kit comprising at least one oligonucleotide probe, the oligonucleotide probe containing at least about 15 contiguous nucleotides of a DNA molecule according to claim 4.

43. A diagnostic kit comprising at least one oligonucleotide probe, the oligonucleotide probe comprising at least about 15 contiguous nucleotides of a DNA sequence selected from the group consisting of SEQ ID NOS:78-86 and SEQ ID NOS:144, 145, 153, 167, 177, 193, 199, 205, 208, 215, 217, 220.

**FIG. 1**

Breast Tumor mRNA
Normal Breast Tissue mRNA

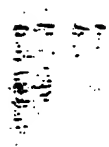
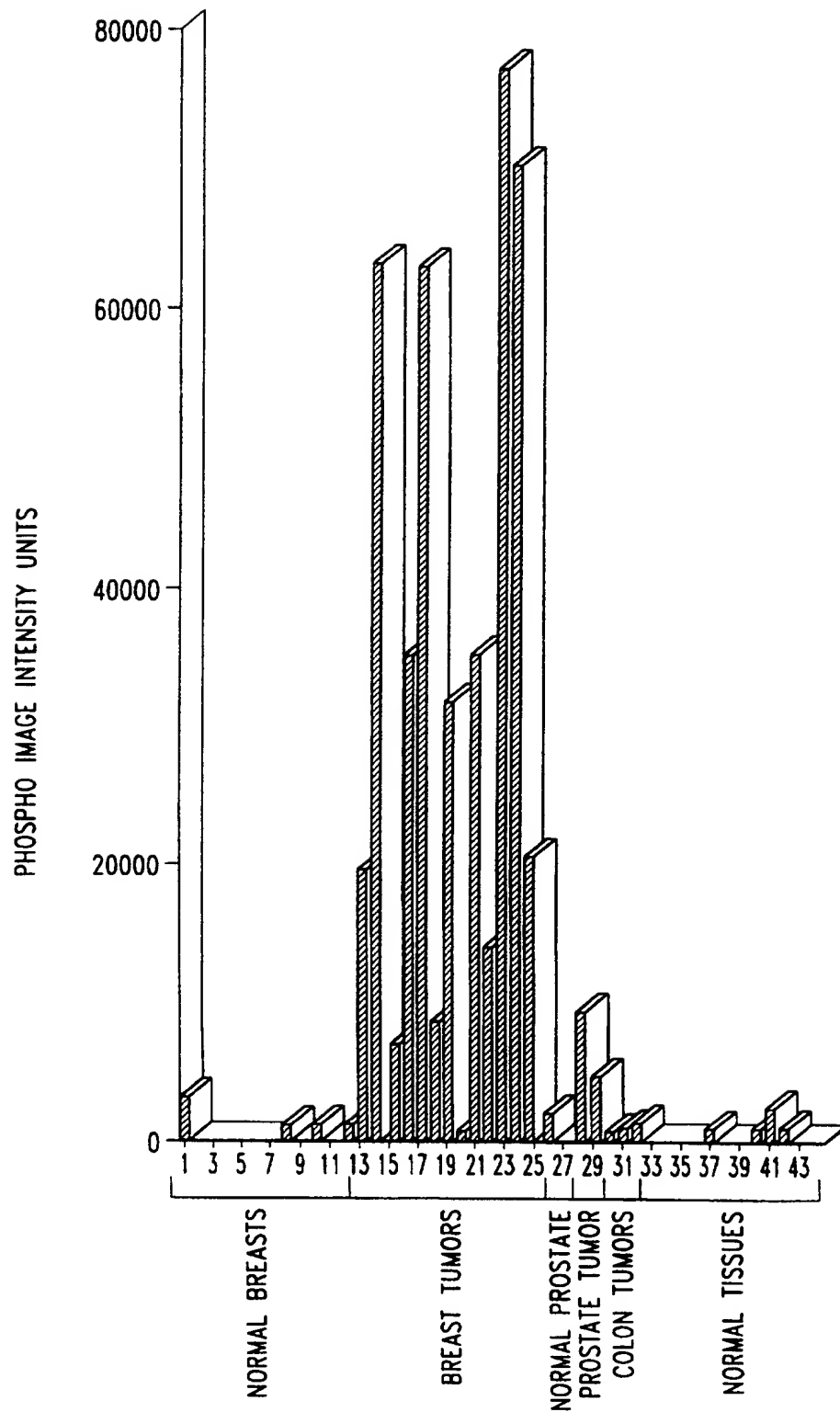


FIG. 2

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*Fig. 3*

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GENOMIC CLONE MAP

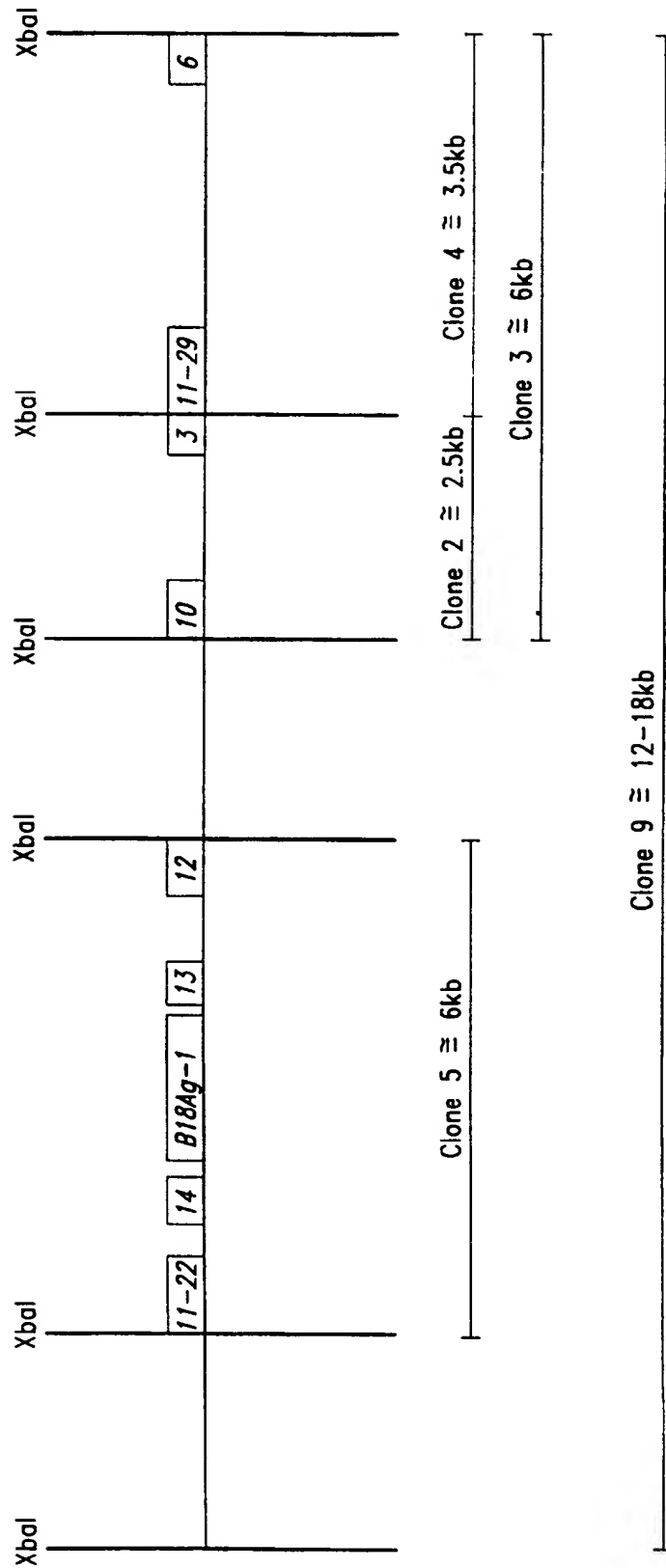
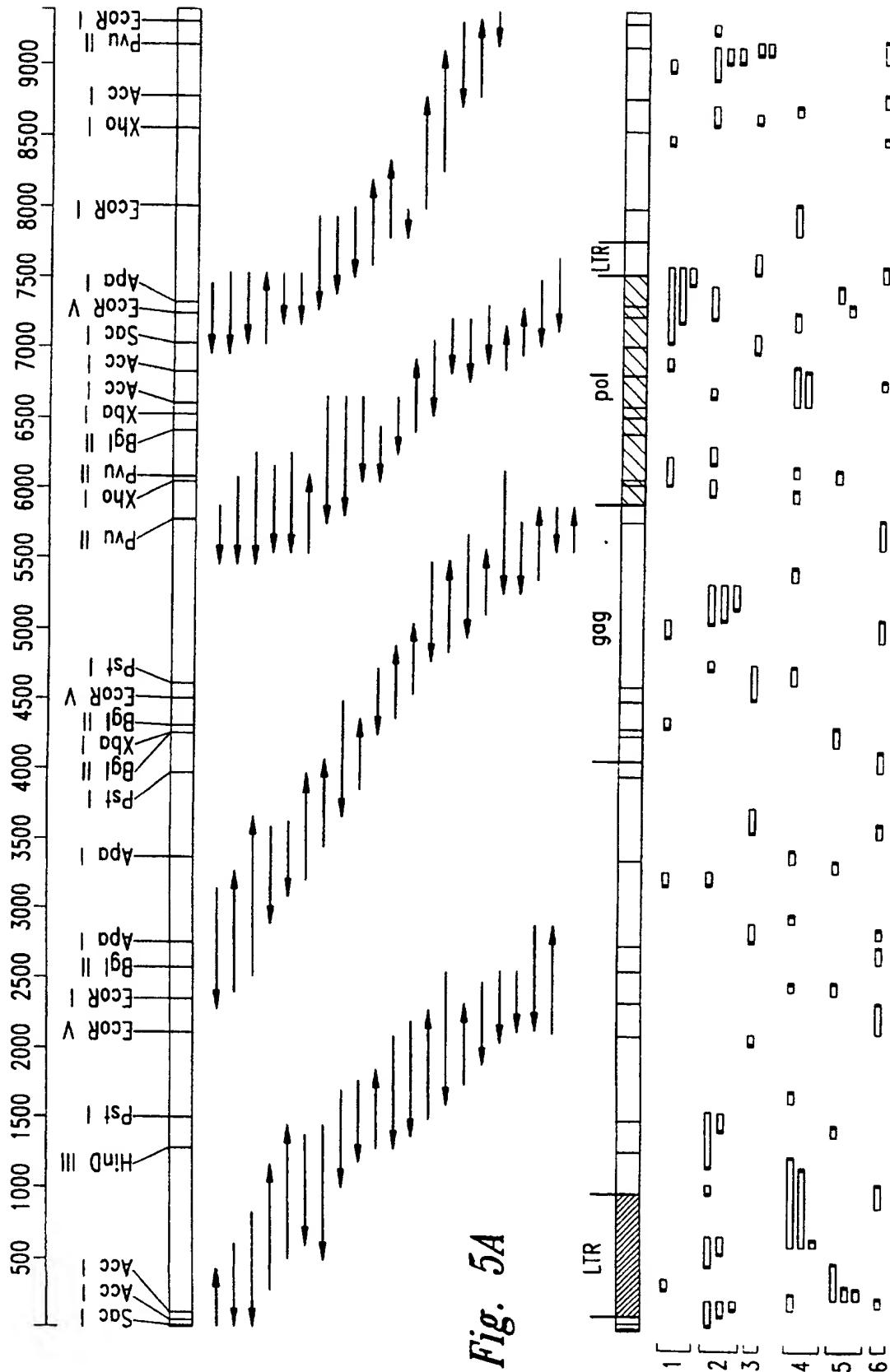


Fig. 4

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B18Ag1

TTA	GAG	ACC	CAA	TTG	GGA	CCT	AAT	TGG	GAC	CCA	AAT	TTC	TCA	AGT	GGA	48
Leu	Glu	Thr	Gln	Leu	Gly	Pro	Asn	Trp	Asp	Pro	Asn	Phe	Ser	Ser	Gly	
1				5					10					15		
GGG	AGA	ACT	TTT	GAC	GAT	TTC	CAC	CGG	TAT	CTC	CTC	GTG	GGT	ATT	CAG	96
Gly	Arg	Thr	Phe	Asp	Asp	Phe	His	Arg	Tyr	Leu	Leu	Val	Gly	Ile	Gln	
			20					25					30			
GGA	GCT	GCC	CAG	AAA	CCT	ATA	AAC	TTG	TCT	AAG	GCG	ATT	GAA	GTC	GTC	144
Gly	Ala	Ala	Gln	Lys	Pro	Ile	Asn	Leu	Ser	Lys	Ala	Ile	Glu	Val	Val	
			35				40					45				
CAG	GGG	CAT	GAT	GAG	TCA	CCA	GGA	GTG	TTT	TTA	GAG	CAC	CTC	CAG	GAG	192
Gln	Gly	His	Asp	Glu	Ser	Pro	Gly	Val	Phe	Leu	Glu	His	Leu	Gln	Glu	
	50					55					60					
GCT	TAT	CGG	ATT	TAC	ACC	CCT	TTT	GAC	CTG	GCA	GCC	CCC	GAA	AAT	AGC	240
Ala	Tyr	Arg	Ile	Tyr	Thr	Pro	Phe	Asp	Leu	Ala	Ala	Pro	Glu	Asn	Ser	
65					70				75						80	
CAT	GCT	CTT	AAT	TTG	GCA	TTT	GTG	GCT	CAG	GCA	GCC	CCA	GAT	AGT	AAA	288
His	Ala	Leu	Asn	Leu	Ala	Phe	Val	Ala	Gln	Ala	Ala	Pro	Asp	Ser	Lys	
				85				90						95		
AGG	AAA	CTC	CAA	AAA	CTA	GAG	GGA	TTT	TGC	TGG	AAT	GAA	TAC	CAG	TCA	336
Arg	Lys	Leu	Gln	Lys	Leu	Glu	Gly	Phe	Cys	Trp	Asn	Glu	Tyr	Gln	Ser	
			100				105						110			
GCT	TTT	AGA	GAT	AGC	CTA	AAA	GGT	TTT								363
Ala	Phe	Arg	Asp	Ser	Leu	Lys	Gly	Phe								
		115					120									

Fig. 6

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B17Ag1

GGGCACAGTG GCTCATACCT GTAATCCTGA CCGTTTCAGA GGCTCAGGTG GGGGGATCGC	60
TTGAGCCCAA GATTTC AAGA CTAGTCTGGG TAACATAGTG AGACCCTATC TCTACGAAAA	120
AATAAAAAAA TGAGCCTGGT GTAGTGGCAC ACACCAGCTG AGGAGGGAGA ATCG	174

FIG. 7

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B17Ag2

```
TGGGGGCTCT GACTAGAAAT TCAAGGAACC TGGGATTCAA GTCCAACGTG GACACCAACT   60
TACACTGTGG NCTCCAATAA ACTGCTTCTT TCCTATTCCC TCTCTATTAA ATAAAATAAG  120
GAAAACGATG TCTGTGTATA GCCAAGTCAG NTATCCTAAA AGGAGATACT AAGTGACATT  180
AAATATCAGA ATGTAAAACC TGGGAACCAG GTTCCCAGCC TGGGATTAAA CTGACAGCAA  240
GAAGACTGAA CAGTACTACT GTGAAAAGCC CGAAGNGGCA ATATGTTTAC TCTACCGTTG  300
AAGGATGGCT GGGAGAATGA ATGCTCTGTC CCCCAGTCCC AAGCTCACTT ACTATACCTC  360
CTTTAT                                     366
```

Fig. 8

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B13Ag2a

```
TATAATCATG TTTCTCATT TTTTCACATT TTATTACCAA TTTCTGTTTA CCCTGAAAAA 60
TATGAGGGAA ATATATGAAA CAGGGAGGCA ATGTTGAGAT AATTGATCAC AAGATATGAT 120
TTCTACATCA GATGCTGTTT CCTTTCCTGT TTATTTCTT TTTATTTCCG TTGTGGGGTT 180
GAATGTAATA GCTTTGTTTC AAGAGAGAGT TTTGGCAGTT TCTGTAGCTT CTGACACTGC 240
TCATGTCTCC AGGCATCTAT TTGCACTTTA GGAGGTGTCG TGGGAGACTG AGAGGTCTAT 300
TTTTTCCATA TTTG 314
```

Fig. 9

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B13Ag1b

```
ATACAGTCGG TTTCCATTTA TTTAACCCCC ACCTGAACGG CATAAACTGA GTGTTCAAGCT   60
GGTGTTTTTT ACTGTAAACA ATAAGGAGAC TTTGCTCTTC ATTTAAACCA AAATCATATT  120
TCATATTTTA CGCTCGAGGG TTTTACC GG TTCCTTTTTA CACTCCTTAA AACAGTTTTT  180
AACTCGTTTG GAACAAGATA TTTTTCCTT CCTGGCAGCT TTTAACATTA TAGCAAATTT  240
GTGTCTGGGG GACTGCTGGT CACTGTTTCT CACAGTTGCA AATCAAGGCA TTTGCAACCA  300
AGAAAAAAAAA ATTTTTTGT TTTATTTGAA ACTGGACCGG ATAAACGGTG TTTGGAGCGG  360
CTGCTGTATA TAGTTTTAAA TGGTTTATTG CACCTCCTTA AGTTGCACTT ATGT      414
```

Fig. 10

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B13Ag1a

```
TATATATTTA ATAACCTAAA TATATTTTGA TCACCCACTG GGGTGATAAG ACAATAGATA 60
TAAAAGTATT TCCAAAAAGC ATAAACCAA AGTATCATAC CAAACCAAAT TCATACTGCT 120
TCCCCACCCC GCACTGAAAC TTCACCTTCT AACTGTCTAC CTAACCAAAT TCTACCCCTC 180
AAGTCTTTGG TGGGTGCTCA CTA CTCTCTTT TTTTTTTTTT TTTNTTTTGG AGATGGAGTC 240
TGGCTGTGCA GCCCAGGGGT GGAGTACAAT GGCACAACCT CAGCTCACTG NAACCTCCGC 300
CTCCCAGGTT CATGAGATTC TCCTGNTTCA GCCTTCCCAG TAGCTGGGAC TACAGGTGTG 360
CATCACCATG CCTGGNTAAT CTTTTTTNGT TTTNGGGTAG AGATGGGGGT TTTACATGTT 420
GGCCAGGNTG GTNTCGAACT CCTGACCTCA AGTGATCCAC CCACCTCAGG CTCCCAAAGT 480
GCTAGGATTA CAGACATGAG CC 502
```

Fig. 11

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B11Ag1

```
ACATGCAGAA TATTCTATCG GTACTTCAGC TATTACTCAT TTTGATGGCG CAATCCGAGC 60
CTATCCTCAA GATGAGTATT TAGAAAGAAT TGATTTAGCG ATAGACCAAG CTGGTAAGCA 120
CTCTGACTAC ACGAAATTGT TCAGATGTGA TGGATTTATG ACAGTTGATC TTTGGAAGAG 180
ATTATTAAGT GATTATTTTA AAGGGAATCC ATTAATTCCA GAATATCTTG GTTTAGCTCA 240
AGATGATATA GAAATAGAAC AGAAAGAGAC TACAAATGAA GATGTATCAC CAACTGATAT 300
TGAAGAGCCT ATAGTAGAAA ATGAATTAGC TGCATTTATT AGCCTTACAC ATAGCGATTT 360
TCCTGATGAA TCTTATATTC AGCCATCGAC ATAGCATTAC CTGATGGGCA ACCCTTACGA 420
ATAATAGAAA CTGGGTGCGG GGCTATTGAT GAATTCATCC NCAGTAAATT TGGATATNAC 480
AAAATATAAC TCGATTGCAT 500
```

Fig. 12

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA3c

```
ACTGATGGAT GTCGCCGGAG GCGAGGGGCC TTATCTGATG CTCGGCTGCC TGTTCGTGAT   60
GTGCGCGGCG ATTGGGCTGT TTATCTCAA CACCGCCACG GCGGTGCTGA TGGCGCCTAT  120
TGCCTTAGCG GCGGCGAAGT CAATGGGCGT CTCACCCTAT CCTTTTGCCA TGGTGGTGGC  180
GATGGCGGCT TCGGCGGCGT TTATGACCCC GGTCTCCTCG CCGGTTAACA CCCTGGTGCT  240
TGGCCCTGGC AAGTACTCAT TTAGCGATTT TGTCAAAATA GGCGTG                        286
```

Fig. 13

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B9CG1

CAGCCCCTTC TTCTCAATTT CATCTGTCAC TACCCTGGTG TAGTATCTCA TAGCCTTACA 60
TTTTTATAGC CTCCTCCCTG GTCTGTCTTT TGATTTTCCT GCCTGTAATC CATATCACAC 120
ATAACTGCAA GTAAACATTT CTAAAGTGTG GTTATGCTCA TGTCACCTCT GTGCCAAGAA 180
ATAGTTTCCA TTACCGTCTT AATAAAATTC GGATTTGTTC TTTCCTATTN TCACTCTTCA 240
C 241

Fig. 14

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B9CG3

```
CAAAGCCAGT GGTITGAGCT CTCTACTGTG TAAACTCCTA AACCAAGGCC ATTTATGATA 60
AATGGTGGCA GGATTTTAT TATAACATG TACCCATGCA AATTCCTAT AACTCTGAGA 120
TATATTCTTC TACATTTAAA CAATAAAAAT AATCTATTTT TAAAAGCCTA ATTTGCGTAG 180
TTAGGTAAGA GTGTTTAATG AGAGGGTATA AGGTATAAAT CACCAGTCAA CGTTTCTCTG 240
C 241
```

Fig. 15

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B2CA2

```
CGACGTCGGT AAAATCGGAC ATGAAGCCAC CGCTGGTCTT TTCGTCCGAG CGATAGGCGC 60
CGGCCAGCCA GCGGAACGGT TGCCCGGATG GCGAAGCGAG CCGGAGTTCT TCGGACTGAG 120
TATGAATCTT GTTGTGAAAA TACTCGCCGC CTTCGTTCGA CGACGTCGCG TCGAAATCTT 180
CGAACTCCTT ACGATCGAAG TCTTCGTGGG CGACGATCGC GGTCAGTTCC GCCCCACCGA 240
AATCATGGTT GAGCCGGATG CTGCCCCCGA AGCCCT 276
```

Fig. 16

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA1

```
CCCAGGTCAA CCAGGCTGCA ACACGCAGGT CCTTGGATTG GGCACGAAGC AGCGCTTCGC   60
TGTTTTCCAG GATTTTCAAC CAGTCGGTCT GGGCGTTCTC ATGGAGCGAG AGCGCCTTGC  120
CCAGCTCATT TTCCAGCGCC TCGTATTCCG TGGAAAAACG CACATCCTCA CCCGCAAAGA  180
CATCCTTTGA AATCGGCTGT TCCGCGAGTT CCAGATANTG CGAGGAGAGC TTGCTCGAAT  240
AGGTCATCCT AACCTTCAA TGCACACCAT GTGCGCCAAT GAATATCTTA ACAATTCAAC  300
TAGTTGGCAT AANAACCGAA CGAAAATCCC AATAGTCTGA AGAGCTCTTT TG          352
```

Fig. 17

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA2

```
CTGCATGTCC ACGGCCTGGA TTTACGGGTG GTCGGCGTTC ACCCCTGGCA GCTGGCGCTC   60
TTCCCGACCA GGGCCAGCAG GATGTGTGGG GCAAGGATAA CGGCGTGCCG ATCGCCTCGA  120
CCTATATGCC TACTGGCAAG GCCGAGCCCG TGAAGGCGG ATTCAGGTTC ANCGGTCGCT  180
GGAGCTTTTC CACCGGCTCC ATGCATTGTG ACTGGCTGTT TCTAGGCGGT CTGTTGCCCA  240
AGCGTGATGG TACGTCTGGC CTGGAGCATG TGACTTTCTG                               280
```

Fig. 18

SUBSTITUTE SHEET (RULE 26)

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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B3CA3

AGCAAGGAGA AGGCCAAGGA GAGGCTCAAG CTGGTCCTGG CCTACGACTG GGCCAAGCTG 60
TCGCCGGGGA TGGTGGAGAA CCTGAAGCGG GACCTCCTCG AGGTCCTCCG CCGCTACTTC 120
TCCGTCCAGG AGGAGGGTCT TTCCGTGGTC TTGGAGGAGC GGGGGGAGAA GATNCTCCTC 180
ATGGTCNACA TCCCCCTCAN GTGATGGTCC TGANGNGNCC CNTCCTCCTT GNCTACGATT 240
TCGGNCTGGT GGCCCTNTTT CT 262

Fig. 19

SUBSTITUTE SHEET (RULE 26)

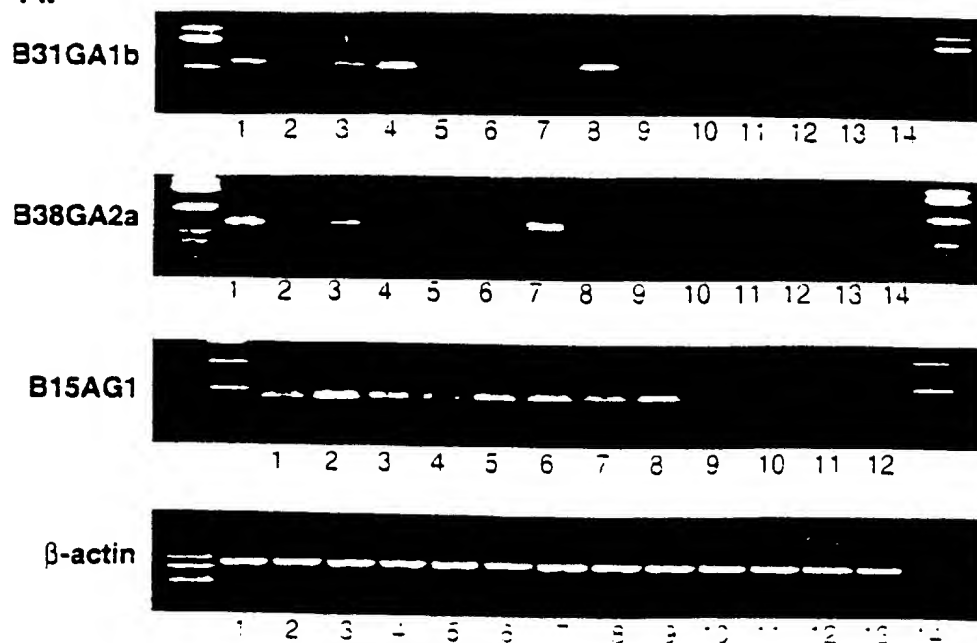
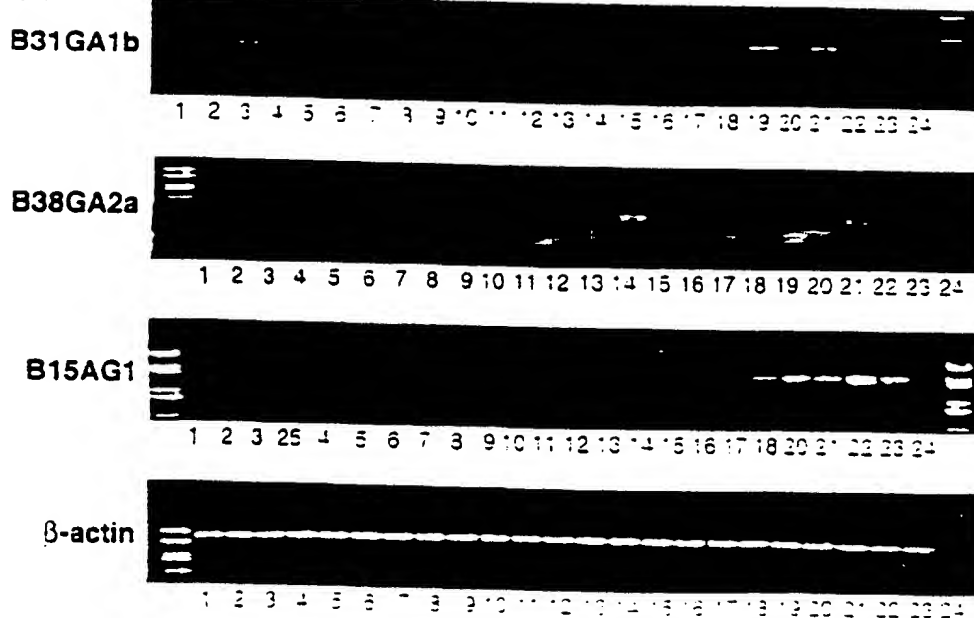
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NUCLEOTIDE SEQUENCE OF THE REPRESENTATIVE
BREAST-TUMOR SPECIFIC cDNA B4CA1

```
AGGAGCGGGT AGAGTGGCAC CATTGAGGGG ATATTCAAAA ATATTATTTT GTCCTAAATG   60
ATAGTTGCTG AGTTTTTCTT TGACCCATGA GTTATATTGG AGTTTATTTT TTAACTTTCC  120
AATCGCATGG ACATGTTAGA CTTATTTTCT GTTAATGATT NCTATTTTAA TTAAATTGGA  180
TTTGAGAAAT TGGTINTTAT TATATCAATT TTTGGTATTT GTTGAGTTTG ACATTATAGC  240
TTAGTATGT                                     249
```

Fig. 20

SUBSTITUTE SHEET (RULE 26)

A.**B.***FIGS. 21A - B*

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 97/00485

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C12N15/12 C07K14/47 C07K14/82 C07K14/15 C12Q1/68
G01N33/53 A61K38/17 A61K39/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C07K C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WERNER T ET AL: "S71 is a phylogenetically distinct human endogenous retroviral element with structural and sequence homology to simian sarcoma virus (SSV)." VIROLOGY, JAN 1990, 174 (1) P225-38, UNITED STATES, XP000670325 see the whole document	1-10,15, 20,22, 28,31, 37,40,42
Y	--- HALTMEIER M ET AL: "Identification of S71-related human endogenous retroviral sequences with full-length pol genes." VIROLOGY, JUN 1 1995, 209 (2) P550-60, UNITED STATES, XP002031074 see the whole document --- -/--	1-9

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

27 May 1997

Date of mailing of the international search report

17.09.97

Name and mailing address of the ISA

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Authorized officer

Gurdjian, D

INTERNATIONAL SEARCH REPORT

Interr. Application No
PCT/US 97/00485

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 95 32311 A (CALYPTE INC) 30 November 1995 see abstract; claims 1,15,23,28,32,34,38 ---	10,20, 22,31,37
Y	LEIBMOSCH C ET AL: "EVOLUTION AND BIOLOGICAL SIGNIFICANCE OF HUMAN RETROELEMENTS" VIRUS GENES, 1995, 11, 133-145, XP000673508 ---	15,28, 40,42
A	see the whole document ---	10,20, 22,31,37
A	GB 2 273 099 A (ASTA MEDICA AG) 8 June 1994 see claims 1,4 ---	10,20, 22,31,37
A	WO 95 19369 A (VANDERBILT UNIVERSITY) 20 July 1995 see page 6, paragraph 2; claims 25-40; examples 1-6 ---	10,20, 22,31, 33,37
A	WO 91 02062 A (TRITON BIOSCIENCES INC) 21 February 1991 see page 9, paragraph 2 - paragraph 3 see page 23, paragraph 2; claims 1-64; example 5 ---	10,20, 22,31, 33,37
A	WATSON M A ET AL: "ISOLATION OF DIFFERENTIALLY EXPRESSED SEQUENCE TAGS FROM HUMAN BREAST CANCER" CANCER RESEARCH, vol. 54, no. 17, 1 September 1994, pages 4598-4602, XP000576043 see the whole document ---	15,28, 40,42
A	ZEHAN CHEN ET AL: "DIFFERENTIAL EXPRESSION OF HUMAN TISSUE FACTOR IN NORMAL MAMMARY EPITHELIAL CELLS AND IN CARCINOMAS" MOLECULAR MEDICINE, vol. 1, no. 2, January 1995, pages 153-160, XP000607858 see the whole document ---	10,20, 22,31, 33,37
A	BYRNE J A ET AL: "A SCREENING METHOD TO IDENTIFY GENE COMMONLY OVEREXPRESSED IN CARCINOMAS AND THE IDENTIFICATION OF A NOVEL COMPLEMENTARY DNA SEQUENCE" CANCER RESEARCH, vol. 55, no. 13, 1 July 1995, pages 2896-2903, XP002025781 see the whole document -----	15,28, 40,42

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

national application No.

PCT/US 97/00485

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see continuation-sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Invention 1 (see continuation-sheet)

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 97/00485

FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

Invention 1 :

Claim 3, claims 1,2,4-10,12,13,15,17-20,22,24,25,27-29,31,33-35,37,39, 40,42 (partially) :
nucleic acids of human endogenous retroviral element
encoding breast tumor specific polypeptides
with sequences 1,3-10,103,126-140,141 , polypeptide with amino
acids sequence 2 ,corresponding polypeptides , antibodies, epitopes ,
pharmaceutical composition , vaccines ,their use for determining the
presence , or monitoring the progresssion of breast cancer and
diagnostic kit .

Inventions 2-142 :

Claims 1,2,4-10,11,13,15,17-20,22,24,25,27-29,31,33-35,37,39, 40,42 (partially) :
nucleic acids encoding breast tumor specific polypeptides
with sequence 11 ,corresponding polypeptides ,antibodies, epitopes ,
pharmaceutical composition , vaccines ,their use for determining the
presence , or monitoring the progresssion of breast cancer and
diagnostic kit .

...ibidem for each of sequences 12-77, 142,143,146-152,154-166,168-176,
178-192,194-198,200-204,206, 207,209-214,216,218,219,221-227
separately

Inventions 143-163 :

Claims 11,14,16,17,19,21,23,24,26,27,30,32,36,38,39,41,43 (partially) :
breast tumor specif c polypeptides with sequence 78 ,corresponding ,
antibodies, epitoras , pharmaceutical composition and vaccines against
breast cancer ,their use for determining the presence , or monitoring
the progresssion of breast cancer and diagnostic kit .

...ibidem for each of sequences 79-86,144,145,153,167,177,193,199,205,
208,215,217,220 separately

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/US 97/00485

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